1-1-1953

An introduction to the study of the Mycomyiini of the Americas.

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AN INTRODUCTION TO THE STUDY OF THE MYCOMYIINI OF THE AMERICAS (DIPTERA: MYCETOPHILIDAE)

COHER - 1953

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Thesis Submitted in Partial Fulfillment

for the Degree of Doctor of Philosophy

University of Massachusetts

Amherst, 1958

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ACKNOWLEDGMENTS

Acknowledgments are due to many individuals and institutions without whose help, advice and encouragement this thesis could not have been undertaken.

First I would like to thank Dr. F.R. Shaw who launched me on a study of the Mycetophilidae. In addition to guidance and the loan of invaluable specimens, he has been extremely patient with my views, expressed and written, on various aspects of the study of fungus gnats.

Dr. C.P. Alexander has aided me greatly in the taxonomic and zoogeographical studies which are basic for the preparation of this paper. He has also been kind enough to comment on and to indicate changes in the zoogeographic section but he is not to be considered responsible for the conclusions. Thanks are due to other members of my committee for their comments, corrections and encouragement. These include Dr. J.F. Hanson, Dr. R.E. Torrey, Dr. W.B Nutting and Dr. R.E. Trippensee. Especial thanks are due to Dr. Torrey and Dr. Nutting for replacing, at a late date, two other members of my committee.

The Institute of International Education was responsible for obtaining for me a grant-in-aid and a fellowship which allowed me to pursue my studies (1949-1950) in Brazil. The grant-in-aid from the Federal Security Agency (Office of Education) is acknowledged with gratitude, as is the courtesy of the Pan American Airways in providing a travel fellowship.

A special acknowledgment is also due to Prof. John Lane (University of Sao Paulo, Brazil) who started me on the investigation of the Mycomyiini and has furnished much of the material studied in the taxonomic portion. He also arranged for my work in Brazil at the Faculdade de Higiene e Saude Publica in Sao Paulo.

The following persons and institutions have been cooperative in the loan of material, and all have made primary and secondary types available for study.

Dr. E.L. Kessel (California Academy of Sciences); Dr. H. Dietrich (Cornell University); Dr. A. Stone (U.S. National Museum); Dr. J. Laffoon (Iowa State College); Dr. J.C. Bequaert and Dr. P.J. Darlington (Museum of Comparative Zoology, Harvard University); Dr. J.R. Vockeroth (Canadian National Collection); Dr. P. Freeman (British Museum, Natural History); Mr. J.A.G. Rehn (Academy of Natural Sciences of Philadelphia); Dr. M.L. Aczel (Instituto Miguel Lillo, Argentina); Department of Entomology (University of Massachusetts).

Dr. E.G. Fisher has kindly allowed me to borrow notes and certain reprints concerning the group. I would also like to thank several of my colleagues who collected material.

INTRODUCTION

The Mycetophilidae (Fungivoridae) is a family of the Nematocerous Diptera. The small, inconspicuous flies of this family are easily distinguished from those of other families by a combination of the following characters: the presence of ocelli and elongate coxae and tibial spurs; the form of the male terminalia; the shape of the pleural sclerites; the two- or three-branched radial field.

The first valid species of fungus gnat was included by DeGeer (1776) in the Linnaean genus Tipula. In 1800, Meigen erected the genus Fungivora the validity of which as a generic name is still in dispute. Meigen (1803) also erected the genus Mycetophila from which the most commonly used name of the family has been derived. In 1863, Winnertz divided the family into three Gruppen. The second "group" included only a single subfamily, the Sciophilinae. This subfamily was principally based on the presence of the "sciophiline" cell, i.e. cell R_3. Edwards (1925) in one of the most important studies of the family modified the concept of the subfamily. His revised concept of the Sciophilinae also included those genera of Johannsen's Series I of Mycetophilinae which had the microtrichiae of the wing "never arranged in lines." At the same time, Edwards divided the subfamily into tribes. The Mycomyiini with two genera was one of those tribes. The third genus in the tribe was not described until 1951. It is with the American species of the Mycomyiini that this thesis is concerned.

Fossil fungus gnats are described from periods as early as the Jurassic. Rohdendorf (1946) presented the most systematic and exhaustive treatment of the group. The family Allactoneuridae Rohdendorf, 1938, is closely related to the modern Sciophilinae.

Baltic amber has provided a wealth of fossil material, Loew (1850) and Meunier (1904, 1922) having described the bulk of the available specimens. Edwards (1940) has reviewed the position of much of Meunier's material. Genera and species from the amber have proved to be very similar, if not identical with modern forms. Mycomyia and Neoempheria are among the genera which have been recorded from the fossil gum.

Recent investigators consider the Mycetophilidae to be most closely related to the Cecidomyiidae and to have had an anisopodid-like ancestor. The Sciophilinae are considered to be derived from the Bolitophilinae by Meunier (1904) while F.R. and M. Shaw (1951) and Shaw and Fisher (1952) indicate that the Sciophilinae are derived from the same ancestral stock as the Ditomyiinae, the Diadocidinae, the Bolitophilinae and the Ceroplatinae (which is considered to include the Macrocerinae (Euphrosyninae) by most specialists). The Mycomyiini is represented as an annectent form between the Sciophilinae and the Mycetophilinae, that is they probably have a common ancestral stock, the Mycomyiini representing the most highly developed group of the Sciophilinae. Characters indicative of the specialization of the Mycomyiini are the absence of empodia, the presence of only two ocelli, the regular rows of tibial setae, the mesocoxal spur of all males Echinopodium and some male Mycomyia, the organization of the male terminalia into well-developed sternal and tergal portions and the shape of the pleural sclerites which are intermediate in form between the Sciophilinae and the Mycetophilinae.

The immature stages of the true fungus gnats have received little attention and as a consequence are poorly known. A few papers on the biology of the group are outstanding. Osten-Sacken's (1886) review and observations on the "Characters of the Larvae of Mycetophilidae" is a valuable summary of the early work. The papers by Stammberg (1924, 1930), Mansbridge (1933) and Madwar (1937) are excellent contributions. Madwar gave a fine critical review of all work on the immature stages of Mycetophilidae to that time and added much new knowledge to the group. There has been little study of the biology of fungus gnats since Madwar's paper. Much of the following review of immature stages is from his work.

The eggs have been almost completely ignored by most workers. The eggs are occasionally seen held in the ovipositor of captured females and have been reported to be laid singly (Heeger, 1851) as well as in clusters and strings (*Sciara*) by Shaw a nd Fisher (1952). Madwar reported that eggs are deposited in patches on the stem, upper and especially lower surface of *Pleurotus* by *Brachypeza*. He described the eggs as oval, white and opalescent. The chorion bears longitudinal rows of tubercles, each tubercle is a stalk with a round convex cap. The eggs of a species of *Mycetophila* are also reported by Madwar to be similar in structure. The embryology of the group has not been studied, however, Butt (1934) has reported on this phase of *Sciara*.

Larvae have a sclerotized head capsule. They are nearly cylindrical, somewhat attenuated at both ends and widest just posterior to the mid-point of their longitudinal axis. Madwar reported four larval stages for all species studied each of which lasted from four to five days. In each stage, the respiratory system differs. The first instar larva is metapneustic; the second instar larva is propneustic; the third instar larva is propneustic but has the spiracles better developed and the fourth instar larva is peripneustic with few exceptions (Ceroplatus, Speolepta).

The larvae cannot withstand mild desiccation. They generally live in fungi and decaying wood but do exhibit a wide variety of habits and habitats. Some Ceroplatinae are carnivorous (Mansbridge, 1933). All known larval forms of the subfamily which are carnivorous form a web of mucus thread "in which are suspended droplets of a clear fluid." These droplets, which are largely composed of oxalic acid, serve to poison the prey. (Buston, 1933) This subfamily also contains luminous forms. The most famous of these is the New Zealand glow worm (Arachnocampa). Hudson (1950) has summed up the literature referring to this species and has also added further observations. Harvey (1952) has summarized the work on other luminous forms. The luminous organ of Arachnocampa has been extensively studied and described by Wheeler and Williams (1915). It is formed by the "dilated tips of the four Malpighian tubules which appear as the four curved, luminous rods in the living larva --." The larvae of the Ceroplatinae measure from 25-28 mm. and are the longest in the family. They are nearly vermiform in appearance. The Bolitophilinae has short, stumpy larvae (5-6mm.)which have locomotory pads and can leap. Apparently the Bolitophilinae live free in fungi and build no mucilaginous larval tube. The Sciophilinae are generally thought to be mycetophagous and are slender (15-18mm.) with no locomotory pads, and form mucilaginous tubes in which they glide forward or backward. One species of Docosia is saprophagous and free-living in the wall of birds nests. The Diadocidinae are similar to the Sciophilinae but their tubes are of dry silk. The Mycetophilinae are of medium length (10-12mm.) with locomotory pads and like the Bolitophilinae they too can leap. At least one species of Phronia is free-living. It bears a case made of its own excrement.

The specificity of fungus feeders is not yet known, however, Edwards (1925:631) says that in Mycetophila some species attack "many different kinds, others being restricted to a single fungus-host. They may be found either in terrestrial or lignicolous fungi, though the same species will usually occur only in one of these classes of host."

The form of the pupa of Mycetophilidae is free. Pupation generally takes place in the ground although some groups pupate in the fungus. I have reared Platurocypta n.sp. which pupated in the fungus. Many Sciophilinae pupae hang free suspended by a few threads whose removal causes the death of the pupa. The removal is thought to interfere with water exchange between the pupa and the substrate. The Bolitophilinae have no cocoon while the Mycetophilinae have a dense cocoon which may be papery in texture. The pupae of Diadocidinae are, like the Sciophilinae, covered by only a few threads. The larval web may support the pupae of some of the Ceroplatinae (Mansbridge, 1933).

Adults of the Mycetophilinae have been observed to remain quiescent for a day or two in the cocoon (Platurocypta n.sp.) or while partly or fully emerged.

Overwintering by adults may be accomplished by hibernation in sheltered places or by active larvae (in caves). It is not reported whether eggs or pupae also overwinter in temperate regions. The number of generations per year of tropical forms is not known.

Many workers have studied the Mycetophilidae. Those whose contributions have profoundly affected the major systematics of the family or whose work relates to the geographical area included in this study and are not fully credited elsewhere are mentioned below.

Several workers have been active in the study of European fungus gnats but only their major works are indicated. Meigen (1818,1830,1838) was the first "to publish extensively upon this family and his works form the foundation of all later work" (Johannsen, 1909:1). Dziedzicki (1884,1885,1889,1910,1915) reviewed much of the family in comprehensive studies of many genera. Winnertz (1863) had previously published his monograph which was the standard work on the family for many years. Landrock (1927,1940) reviewed the modern standing of the genera and species of western Europe. The important worker in Japan is Okada, whose series of papers from 1935 to 1940 are the most informative on that area. Brunetti (1912) has reviewed the Indian species, corrections on the work being made by Edwards (1924). New Zealand fungus gnats were treated by Tonnoir and Edwards (1926) and subsequently Tonnoir (1929) amplified Skuse's (1888,1890) work on Australian mycetophilids.

The Ethiopian region has received little attention and that area probably will be a fertile field for study of fungus gnats for some time to come. Finally, the Neotropical region, which may prove to have the largest fungus gnat fauna of any region has recently received the attention of Lane who has published a series of papers since 1946.

THE MYCOMYIINI

The Mycomyiini (Edwards, 1925) with which this study is concerned is a tribe in the subfamily Sciophilinae and includes the following genera: Mycomyia Rondani,1856; Neoempheria Osten-Sacken,1878; Echinopodium Freeman,1951.

Systematically, the tribe is widely divergent from the other members of the subfamily and its three genera are easily recognized by one single character, i.e. the tibial setae are arranged in regular longitudinal rows. The tribe is characterized by the following combination of features:

Head in front of and moderately high on thorax; ocelli two, large, medianly placed; vertex and occiput setiferous; frons bare; anteclypeus pilose; antenna with 2-14 segments; palpus with four segments.

Thorax with pleura bare except anterior pronotum and proepisternum (metaepisternum setiferous in Echinopodium); episternum divided into subequal anepisternum and katepisternum; mesonotum moderately arched, acrostichal and dorsocentral setae in rows; postnotum bare (setiferous in Echinopodium and some Mycomyia); single scabellar seta; males with or without mesocoxal process (Neoempheria males never with process); tibial setae arranged in regular longitudinal rows; tibial spurs 1-2-2; empodia absent; wing with Sc long, branched or not; cell R_3 present; macrotrichia absent on wing membrane.

Abdomen with seven segments visible; sternites not divided by longitudinal sutures; eighth segment reduced.

Terminalia divided into tergal and sternal portions with a conspicuous anal segment.

Adults of this tribe are generally small (3.5 to 5mm. wing length) and when at rest hold their wings in a divaricate position. They are often captured by sweeping along woodland paths and have been taken in a baited or unbaited Shannon trap. Fungus gnats are seldom recorded from light traps.

As early as 1776 DeGeer described a larva that may possibly be a sciophiline. Dufour (1841) described the larva of the genotype of _Neoempheria_ as _Sciophila striata_ Mg.,1818. Perris (1849) added observations on the habits of _S. striata_.

Larvae have been found in fungi-encrusted bark (_Poria_), in bracket fungi and in decaying wood. Edwards (1925) reported that the larvae "spin slimy webs on the under surface of bark-growing fungi or under bark. No definite cocoon is formed, the short stout pupa being merely slung up by a few threads." Malloch (1917) briefly described the larva and pupa of _Mycomyia brevivitta_ (Coq.) and figured the pupa, the ventral surface of the head and the left mandible of the larva. Madwar (1933), in addition, described and figured the larvae of two European species of _Mycomyia_. From the literature the following characters of the larvae of _Mycomyia_ have been compiled. Antennae rudimentary, composed of one segment. Larva enclosed in a slimy tube. Locomotory pads absent. Larva not vermiform. The respiratory system is peripneustic. The epicranial plate is broadly joined anteriorly and widely separated posteriorly.

In most well-studied regions and in comparison with other genera of Mycetophilidae, the virtually cosmopolitan genus _Mycomyia_ has proved to be one of the largest groups in number of species. _Neoempheria_ is best developed in the tropics while _Echinopodium_ is apparently restricted to the Chilean subregion.

Neoempheria has been regarded as a subgenus of _Mycomyia_. Johannsen did not accept it as a genus until 1910. Edwards (1925) considered _Neoempheria_ as a genus, then considered it to be a subgenus at least as late as 1931, accepting it again as a genus in 1940. It is Edwards' 1940 paper that forms the basis for work on the Neotropical species of the genus.

The female fungus gnats of this tribe generally can not be correlated with the males. Anatomical characters are often lacking to separate females whether they are closely related or not. In the future, reared series may allow correlation with males and it may perhaps be proved that the female terminalia are of value in species diagnoses.

TERMINOLOGY

Within the family of fungus gnats a uniform system of terminology is lacking. Although this is regrettable it seems probable, considering the number of workers presently engaged in studies of the group, that there is little chance for such consistency to arise. Since the lack of a uniform system of names exists, discussion of the terms chosen for use in the following study is required.

The Head

Crampton (1942) gives an excellent discussion of the terminology for the areas of the head capsule of Diptera. His terms are accepted a nd delimited as follows:-

Occiput: posterior surface of head, area posterior to and laterad of eyes, fused indistinguishably with vertex.

Vertex: region on top of head and behind the ocelli; ocellar bristles (used herein to denote two large median setae behind ocelli).

Frons: divided into postfrons and prefrons; postfrons situated in front of ocelli and with attenuated portion between eyes to base of antennae; prefrons from below antennae to clypeus which is demarked by an inverted U-shaped frontoclypeal suture.

Clypeus: divided into postclypeus and anteclypeus by a transverse clypeal suture.

The Thorax

Crampton (1942) is followed in the interpretation of the dorsal and pleural sclerites. The sternites, which are concealed by the coxae, do not seem to be of any use in the systematics of the group. Shaw (1948) and F.R. Shaw and M. Shaw (1951) were the first to apply the Crampton terminology in their study of the relationships of fungus gnat genera.

The terms used are as follows:-

Prothorax: anterior and posterior pronotum; proepisternum; proepimeron.

Mesothorax: paratergite; postspiracular plate; anepisternite; katepisternite; mesoepimeron; pleurotergite; mesonotum; scutellum.

Metathorax: postnotum; metaepisternum; metaepimeron.

The Legs

The tibial spurs are apical and anterior. The combs are median and there may be a small comb between the tibial spurs of the mid and hind legs. The mesocoxal spur of the males is anteroapical and very variable in form.

The Abdomen

The segments of the tergites or sternites of the abdomen are indicated respectively by the abbreviations T or S in front of Roman numerals.

Wing Venation

In the use of wing venation terms applied to the fungus gnats there is a notable lack of conformity evident. This is particularly noticeable in regard to the names of the veins of the radial field, some authors even being inconsistent in the body of a single paper.

The Alexander (1927) interpretation of the radial field and the Tillyard (1919) interpretation of the medial-cubital field are adopted in the following work.

Once again Crampton (1942) is consulted for corroborative evidence. In his phylogenetic treatment of the Diptera, he considered that the Tipulomorpha were related to the Psychodomorpha and Phryneomorpha but were "of little phylogenetic interest ----- their line of development ------- ending blindly." However evolutionary tendencies occurring in the tipuloids may well be indicative of those taking place in closely related groups particularly to the Tanyderidae, Ptychopteridae, bruchomyine Psychodidae and Trichoceridae.

Within the Tipuloidea, Alexander (1927) showed that vein R_2 cephalized apically with vein R_1 and atrophied basally, thus making the apex of the first vein of the radial field R_{1+2}. Starting with this theory, the question then arises as to the identity of the two remaining veins in the more primitive members of the family Mycetophilidae.

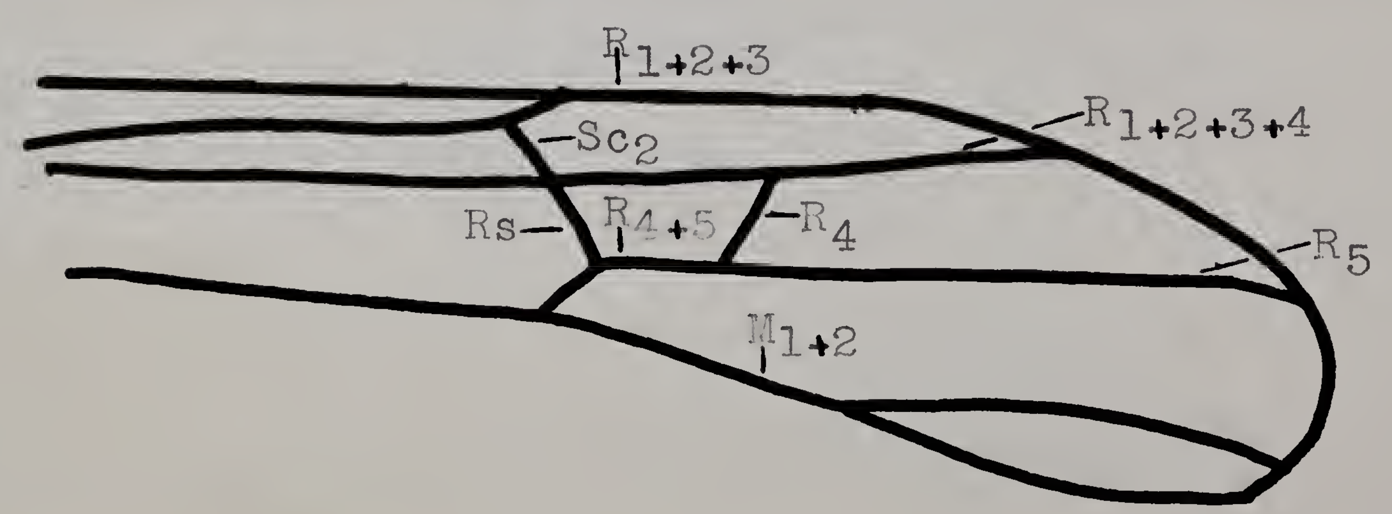
The Blepharoceridae, a group in the Psychodomorpha, shows modifications in venation which, in light of the above discussion, are worthy of consideration as a key to the identity of veins in the radial field. Kellogg (1903) shows an excellent example of the progressive cephalization and reduction of R_3 (considered by him to be R_2). If Edwardsina with its four radial branches reaching to the apical margin of the wing is added to the series, it may be seen that a change from the four-branched to the three-branched condition has taken place. Instead of the original R_{1+2}, R_3, R_4 and R_5, we now have R_{1+2+3}, R_4 and R_5.

In the Phryneomorpha, the group that contains the Mycetophilidae, the primitive four-branched Trichoceridae lead to the four-branched (Axymyia) and three-branched (Anisopus) condition of the Anisopodidae which are considered an annectent family between the Trichoceridae and Mycetophilidae. Then, if we consider that the three-branched condition in this group arose as in the Blepharoceridae we can assume the same venation.

An alternative suggestion is to consider that R_3 has atrophied and that the primitive condition of the Mycetophilidae is R_{1+2}, R_4 and R_5. There is also the possibility that R_4 has atrophied and that the primitive condition of the fungus gnats is R_{1+2}, R_3 and R_5 or, perhaps R_4 has caudalized and the condition of the veins is R_{1+2}, R_3, R_{4+5}.

In the light of the preceding discussion, I consider that in the Mycetophilidae, the Ditomyiinae start with the three-branched condition R_{1+2+3}, R_4 and R_5. The second branch (R_4) shortens in the Ceroplatinae and Bolitophilinae either ending free or starting to be captured by R_{1+2+3}. Finally in the Sciophilinae R_4 begins to move basad and finally drops out.

The Mycomyiini is a tribe in the Sciophilinae and from the foregoing discussion I consider that the following is the condition of the radial field:



The confusion attending the naming of the radial field has been less noticeable in the terminology of the medial-cubital fields. The recent use by various authors of M_{1+2} for the first branch of the media seems to be incorrect, since the first fork of media bears the first two branches; i.e. M_1 and M_2. This is the interpretation accepted in this paper. The question arises about the homology of the next vein. According to Tillyard, this vein would be M_4. Since I can find no evidence for the true homologies of this vein I am accepting Tillyard's interpretation. Therefore what has been considered to be Cu1 by most authors and M_3 by Tonnoir is here called M_4. There is every possibility that this vein is really M_{3+4} but I have no proof of this and so accept the Tillyard system unmodified.

In consequence of the above interpretation, the vein commonly considered to be Cu_2 now becomes Cu_1. The weak vein behind this becomes Cu_2 and the next and stronger vein is the anal.

In summary then, the following is a list of the terms adopted for the wing veins of the Mycomyiini and with little or no modification for the fungus gnats in general:

Sc - Sc_1
Sc_2

R - R_{1+2+3} base of first branch when R_4 is captured
(first branch when R_4 is present)
$R_{1+2+3+4}$ (first branch when field is two-branched)
Rs
R_{4+5} (base of fork when three-branched)
R_4
R_5

M - M_{1+2} (petiole of anterior fork of M)
M_1
M_2
M_4

Cu - Cu
Cu_1
Cu_2

A - 1stA

Male Terminalia

The terminalia of the Mycomyiini show a similarity of structure that is well-suited to the nomenclature proposed by Edwards in his study of the Neotropical species of <u>Neoempheria</u>. This nomenclature proposed by Edwards in his study of the Neotropical species of Neoempheria. This nomenclature has been adopted for the present study of all genera in the tribe.

Coher (1950,1952) applied the terminology to the Neotropical elements of Mycomyia. It should be noted that the style labelled dististyle (d) in the first paper was mis-named and should be properly called the tergal process. The term dististyle implies a process of the sternal portion of the terminalia and was correctly applied in the second paper. The term dististyle is discarded in favor of Edwards' term outer style or outer sternal process. The middle sternal process of Coher becomes the inner style, the inner sternal process being equal to the inner process.

Echinopodium has a simplified tergal portion of the terminalia to which it is not necessary to apply any involved terminology.

Sternal portion: outer style (os); inner style (is); inner process (ps); ninth sternite (sternal lobes = basistyle (Echinopodium)) (s); parameres (pm); aedeagus (a); accessory styles (sx), lobes (lx), etc.

Tergal portion: tergal style (ninth tergite of Edwards) (t); apical process (pt); anal segment (as); accessory styles (tx); lobes (tlx), etc. The basal portion of the tergal style is the entire part below the apical process.

Many species of the genus Neoempheria have an area on the outer style which is of unknown function and whose structure is difficult to determine. In a specimen treated with caustic potash and then stained with acid fuchsin this "porose" area may appear. Its presence or absence seems to be a group character and its position on the outer style is apparently constant within a group. This particular area often stains with difficulty and therefore I am not certain whether it is actually absent in some of the groups. The presence of the "porose" area was indicated by stippling on a few of Edwards' drawings but no comments were made concerning their presence.

THE GENUS NEOEMPHERIA OSTEN-SACKEN, 1878

1863. Empheria Winnertz, Verh. zool.-bot. Ges. Wien 13:739 -- type species Sciophila striata Mg., 1818 as first species considered under the new genus. (Empheria preoccupied, Hagen, 1856).

1878. Neoempheria Osten-Sacken, Smithsonian Misc. Coll. 270:9 -- new name for Empheria.

1909. Mycomya (Neoempheria), Johannsen, Genera Insectorum 93:45 -- considered as subgenus of Mycomyia.

1910. Neoempheria, Johannsen, Maine Agric. Exp. St. Bull. 180:157 -- regarded Neoempheria as a valid genus.

1911. Plecnazoneura Enderlein, Stettin. Ent. Zeit. 72:156 -- type species P. johannseni Ender.

1911. Neurocompsa Enderlein, Stettin. Ent. Zeit. 72:158 -- type species N. ornatipennis Ender.

1925. Neoempheria, Edwards, Trans. Ent. Soc. London 1924:553.

1931. Mycomyia (Neoempheria), Edwards, Tijd. v. Ent. 74:264.

1940. Neoempheria, Edwards, Nov. Zool. 42:107 -- Study of the genus in the Neotropical Region with first grouping of the species. Plecnazoneura and Neurocompsa synonymized.

Head: Ocelli always on a dark prominence; ocellar bristles often reaching nearly to base of antennae; eyes scarcely or not emarginate above antennae, almost round; postclypeus bare; anteclypeus setiferous; mouthparts short.

Thorax: scutellum with two(2) or four(4) or more large setae, all New World species except <u>balioptera</u> have two(2); males never with mesocoxal spurs; tibial combs generally 1-2-2; wing with costa produced at least slightly beyond R_5; R_5 not reaching tip of wing; subcosta branched; wings patterned; fold generally present in cell R_5.

Terminalia always with an obvious outer style except <u>balioptera</u> (Nearctic) and <u>lineola</u>(Palaearctic). The outer style is articulated to the sternal portion of the terminalia.

In discussion of this group color description is generally avoided. The pattern of the wing, however, is remarkably constant in available series (even though the intensity may vary). The pleural markings are also well-defined. The abdominal markings and mesonotal stripes have been found to be quite variable. In general, all species show acrostichal, dorsolateral and sublateral stripes of the mesonotum, the variation being extensive even within a species.

NEOTROPICAL NEOEMPHERIA

Introductory Discussion

Prior to the systematic treatment of Neotropical Neoempheria by Edwards (1940), six species and one "variety" of fungus gnats pertaining to the genus, had been described from this faunal region. Lynch-Arribalzaga (1892) described two species from the Chaco, Argentina, originally placing one in Empheria and one in Sciophila. Williston (1896) described a single species from St. Vincent, B.W.I. Kertesz (1909) considered his two species from Santa Catarina, Brazil as the genotypes of the new genera Pleonazoneura and Neurocompsa. Besides this, Enderlein also erected a "variety" of one of his species.

The type series of the Enderlein and Williston material was available to Edwards, with the result that those species have been fixed and Enderlein's two genera synonymized with Neoempheria. It is of interest to note that Enderlein's two "species" and "variety" proved to be comprised of specimens of six species. In addition, Edwards placed N. varipennis (Lynch-Arribalzaga) 1892, although the types are not available if they do exist. Brazilian specimens, not too distant geographically, were recognized as the Lynch-Arribalzaga species. I accept the designation in order to avoid confusion in the group. Two species incertae remained although Edwards discussed their probable position.

Edwards' paper includes, besides discussion of the previously described species, descriptions of twenty-eight (28) new species and one new subspecies. Four of the new species were described from females. A system of grouping species to show their probable relationships was also adopted.

Unfortunately, for the purpose of the present study, Edwards' types are unavailable except for that of the one subspecies described. Despite this, topotypic material has proved that his descriptions and drawings are usually accurate enough to make his species recognizable. For the present, however, it should be considered that new records of Edwards' species are based on my interpretation of his descriptions. The importance of this may best be appreciated when the closely related species are studied, since it is often very minute characters that serve for differentiation.

The last descriptions of new Neotropical Neoempheria were published by Shaw (1940) in an account of Costa Rican fungus gnats. Three species were described and since the paper followed Edwards' study by only a few months a single case of homonymy occurred. This species has been renamed. I have seen the holotype of each of the three species.

With this previous work as a foundation, more material and consolidating the taxonomic studies of the genus. From the augmented systematics of the genus an attempt is made to investigate the distribution of Neoempheria in the Neotropical region. It seems probable that a study of Neoempheria of other regions, particularly the Palaeartic, will indicate the necessity for reviving Enderlein's Pleonazoneura as a subgeneric name for the Neotropical elements of the genus.

Instead of the eight(8) groups proposed by Edwards, the following study contains eighteen(18). For ease in identification, these groups are known by the name of the oldest described species they contain. This method seems to be preferable to the "letter" method previously used. Exceptions in the use of the oldest name are made in the case of (1) the maculipennis group since I have already mentioned the uncertainty of the designation of varipennis by Edwards and (2) the neivai group in which the identity of two of the species is still uncertain.

The groups are based on such characters as: length of ocellar bristles: length of first flagellar segment in comparison to length of scape and pedicel; length of apical dorsal seta of pedicel; pleural markings; wing markings; position of the posterior fork; wing vein setation; shape and setation of the eighth tergite and the eighth sternite; form of the terminalia. As a result of this augmented interpretation of the groups, the groups proposed in this paper do not always correspond to those proposed by Edwards. Edwards' Group F no longer exists since its species have been regrouped.

Key to the Groups of Neotropical Neoempheria

1. Pleura with definite dark stripe from wing base to base of forecoxa, sometimes faint -- 2.
   Pleura not so marked, stripe longitudinal or a dark spot at wing base or unicolorous or lighter above or lighter below --------- 5.
2. Ocellar bristles reaching just beyond ocellar prominence, outer style subcylindrical -------------------------------------- spinosa (p.32)
   Ocellar bristles long, reaching to or nearly to base of antennae; outer style subcylindrical or elongate subrectangular or subtriangular -- 3.
3. Outer style subtriangular; apex of wing not infuscated or with hyaline or light areas apically in cells R_5 and M_1; anal segment short -- maculipennis (p.35)
   Outer style subcylindrical or elongate subrectangular; apex of wing infuscated; anal segment short or long ------------------------- 4.
4. Outer style elongate subrectangular; anal segment short; basal cell with faint basal infuscated spot or basal cell hyaline -- ornatipennis (p.56)
   Outer style subcylindrical; anal segment long; basal cell hyaline -- portoricensis (p.78)
5. Costal margin of wing infuscated, including all or most of basal cell and cell R_4 -- 6.
   Wing not so marked -- 7.
6. Ocellar bristles reaching to just beyond ocellar prominence; apical

dorsal seta of pedicel shorter than first flagellar segment; eighth sternite fused to sternal portion of terminalia ---- -- neivai (p.27)

Ocellar bristles reaching nearly to base of antennae; apical dorsal seta of pedicel as long as first two flagellar segments; eighth sternite not fused to terminalia, subquadrate ------------------ -- brasiliensis (p.111)

7. Posterior fork under or distad of fR ---------------------------- 8.

Posterior for basad of fR -- 9.

8. Pleura unicolorous; dark band below R_{4+5} fading before posterior fork; basal cell infuscated basally; eighth sternite subtriangular -- raboloi (p.102)

Pleura lighter above; dark band below R_{4+5} extending through posterior fork; basal cell hyaline; eighth sternite subrectangular -- vogeli (p.99)

9. Ocellar setae reaching to base of antennae ------------------------10.

Ocellar setae reaching just beyond ocellar prominence or shorter --12.

10. Subcosta bare; tergal portion of terminalia without basal patch of setae; anal segment long ------------------------------ jugalis (p.90)

Subcosta setose at least apically; tergal portion of terminalia with basal patch of setae; anal segment short ------------------- 11.

11. Postnotal band dorsal, poorly developed; wing with hyaline area below R_{4+5} ---------------------------------- costaricensis (p.96)

Postnotal band subdorsal, V-shaped; wing infuscated below R_{4+5} -- -- lindneri (p.73)

12. Ocellar bristles not reaching beyond ocellar prominence --------
-- bipectinata(p.30)

Ocellar bristles reching just beyond ocellar prominence ------ 13.

13. Outer style spatulate; anal segment long ----------- faceta(p.93)

Outer style subcylindrical; anal segment short --------------- 14.

14. Sc normally bare; pleura dark above --------------- pereirai(p.105)

Sc normally setose for some of its apical portion; pleura unicolorous -- 15.

15. Wing with infuscation below R_{4+5} ---------------- paulensis(p.108)

Wing infuscated below R_{4+5} ------------------------------------- 16.

16. Cell R_3 more than twice as long as wide, longer than M_{1+2} -------
--- johannseni(p.81)

Cell R_3 not twice as long as wide, shorter than M_{1+2} --------- 17.

17. Postnotal band dorsal ------------------------- costa-limai(p.83)

Postnotal band subdorsal, V-shaped ----------- biflagellata(p.88)

Description of Species

neivai group

Ocellar bristles reaching beyond ocellar prominence; antenna with first flagellar segment subequal to length of scape plus pedicel, apical dorsal seta of pedicel shorter than first flagellar segment. Thorax unicolorous. Wing with Sc_2 ending well beyond base of Rs, Sc setose on apical half; cell R_3 little longer than wide, about one-half as long as M_{1+2}; M_1, M_2, M_4, Cu and Cu_1 setose; posterior fork basad of fR; costal and basal cells entirely infuscated, hyaline below R_{4+5}, apex infuscated. Eighth tergite subtrapezoidal, anterior margin widely and shallowly emarginate, posterior margin setiferous. Eighth sternite fused to sternal portion of terminalia. Terminalia with outer style subrectangular, "porose" area apparently absent; anal segment short.

This group corresponds to Edwards' Group A.

1. *N. neivai* Edwards, 1940.
2. *N. formosensis* (I.-A.), 1892.
3. *N. apicalis* Kertesz, 1909.

1. Neoempheria neivai Edwards,1940.

1940. Edwards, Novitates Zoologicae 42:109, 2 males, 2 females, txt. fig.1a(male terminalia), Pl.I,fig.1(wing) -------------BRAZIL (Santa Catarina - holotype male); BRITISH GUIANA(Kutari Sources).

Variations noted in my specimens from the description given by Edwards are: males with first and part of the second abdominal tergites yellowish, the female with abdominal tergites one to four yellowish; hind femora yellowish; pleura variably reddish-yellow; M_2 bare near base. In addition, the mid and hind tibial combs are sparse.

Additional records: BRAZIL:-1 topotypic male, Sept.11,1938(F. Plaumann); State of Sao Paulo: male and female in copula, Faz. Sao Joao, Onda Verde, Jan.1946(F. Lane). PANAMA:-1 male, Cabima, May 17,1911(A. Busck).

Observations: This is the only species currently recognized in the group. It seems to closely resemble N. formosensis(L-A) and N. apicalis Kertesz, as suggested by Edwards. The only reason I do not consider neivai to be synonymous with either of the earlier described species is that it is not yet known to occur in Argentina or Peru.

I consider the process labelled "outer style" in Edwards' figure of this species to be the inner process. The long style ventrad of this and arising from the sternal lobes may then be considered as the outer style.

2. Neoempheria formosensis (Lynch-Arribalzaga), 1892

1892. Sciophila formosensis Lynch-Arribalzaga, Bol. Acad. Nac. Cienc., Cordoba 12:416, 1 male ----- ARGENTINA(Chaco).
1900. Sciophila formosensis, Hunter, Trans. Amer. Ent. Soc. 26:278 ---- catalogue.
1909. Mycomya formosensis, Johannsen, Genera Insectorum 93:47.
1940. Edwards, Novit. Zool. 42:107,110 ----- transferred to Neoempheria.

I agree with Edwards' interpretation of Lynch-Arribalzaga's species, however, I am more inclined to think that neivai will prove to be a synonym of the older species. This synonymy cannot be attempted unless specimens are taken from the Chaco.

3. Neoempheria apicalis Kertesz, 1909

1909. Kertesz, Ann. Hist. Nat. Mus. Hung. 7:140, 1 female ----- PERU. (Callanga).
1940. Edwards, Novit. Zool. 42:110.

Edwards stated that this species must belong to this group. It is probably a synonym of formosensis.

bipectinata group

Ocellar bristles short, not reaching beyond ocellar prominence; antenna with first flagellar segment shorter than scape plus pedicel, apical dorsal seta of pedicel subequal to first flagellar segment. Pleura with a nearly longitudinal dark stripe. Wing with Sc_2 ending just beyond base of Rs, Sc setose on apical half; cell R_3 about three times as long as wide, subequal to M_{1+2}; M_1, M_2, M_4, Cu and Cul setose; posterior fork basad of fR; infuscated heavily as in neivai group but with broad dark band from below R_{4+5} to posterior margin of wing including apex of cell M_4 and anal cell, costal and basal cells hyaline, apex infuscated. Eighth tergite subtrapezoidal with posterior margin strongly convex and setiferous. Eighth sternite subtriangular, apically truncate; with apex widely and moderately emarginate, the two lateral apical lobes setiferous. Terminalia with outer style subcylindrical, slightly widened at base; anal segment short but wide with strong setae.

This group corresponds to Edwards' Group B.

4. N. bipectinata Edwards,1940.

4. <u>Neoempheria</u> <u>bipectinata</u> Edwards,1940.

1940. Edwards, Novit. Zool. 42:110, 1 male - holotype, 1 female, txt. fig.1b(male terminalia), Pl.I,fig.2(wing) ------ BRAZIL(Santa Catarina).

Differences noted in my specimen from the description given by Edwards are: yellowish portion of abdomen mottled; terminalia with inner style bifid, shorter portion about one-half as long as the elongated part and nearly at a right angle to it at base; paramere with a median pointed portion reaching nearly to apex of lobes.

Additional records: BRAZIL:- State of Goiaz: 1 male, Corumba, Nov. 1945(M. Barretto).

spinosa group

Ocellar bristles reaching beyond ocellar prominence; antenna with first flagellar segment shorter than scape plus pedicel, apical dorsal seta of pedicel broken on specimens I have seen. Pleura with dark oblique stripe from wing base to base of forecoxa; bare stripes between acrostichal setae and dorsocentrals and between dorsocentrals and sublaterals. Wing with Sc_2 ending at base of Rs, Sc setose on apical half; cell R_5 about three times as long as wide, as long as M_{1+2}; male with M_1, M_2, M_4 and Cu1 setose; female with M_1 setose at tip, M_2 bare or with a few setae at tip, M_4 bare, Cu1 setose at base, Cu sparsely setose; posterior fork basad of fR; a broad dark band from below R_{4+5} to posterior margin of wing including apex of cell M_4 and anal cell, basal cell with a dark spot at base, apex irregularly infuscated. Eighth tergite subtrapezoidal, posterior margin slightly convex, setiferous. Eighth sternite subrectangular, posterior margin widely and shallowly emarginate, setiferous. Terminalia with outer style subcylindrical; anal segment short.

This group corresponds to Edwards' Group C.

5. *N. spinosa* Edwards,1940.

6. *N. brevicauda* Edwards,1940.

7. *N. simplex* Edwards,1940

8. *N. bilobata* Edwards,1940.

9. *N. borgmeieri* Edwards,1940.

5. <u>Neoempheria</u> <u>spinosa</u> Edwards,1940.

1940. Edwards, Novit. Zool. 42:111, 8 males - holotype, 2 females, fig.2(male terminalia), Pl.I,fig.7(wing) ----- BRAZIL(Santa Catarina).

Additional specimens: One topotypic male, Nov.9,1939.

6. <u>Neoempheria</u> <u>brevicauda</u> Edwards,1940.

1940. Edwards, Novit. Zool. 42:112, 1 female, Pl.I,fig.8(wing) ----- BRAZIL(Santa Catarina).

7. <u>Neoempheria</u> <u>simplex</u> Edwards,1940.

1940. Edwards, Novit. Zool. 42:112, 1 male - holotype, 1 female, txt. fig.3a(male terminalia), Pl.I,fig.10(wing) ----- BRAZIL(Santa Catarina).

In addition to differences noted from Edwards' description, the abdomen of the male is described here for the first time. TI yellow with postero-dorsal dark spot; TII with antero-lateral dark saddle; TIII with antero-lateral angle light; TIV dark with lateral dappling; TV and TVI dark. Differences from the original description are as follows: mesonotal markings light, postnotum yellowish-brown, apical half of M_1, M_2 and M_4 setose, wing intermediate between <u>simplex</u> and female variety as shown by Edwards, dark area above M_1 more like that in the variety. Tip of the tergal portion of the terminalia narrow with a flattened lobe.

Additional records: BRAZIL:- State of Sao Paulo: 1 male, Boracea, Nov.1947(Rabello and Travassos).

8. Neoempheria bilobata Edwards,1940

1940. Edwards, Novit. Zool. 42:113, 1 male, txt. fig.3b(male terminalia), Pl.I,fig.11(wing ------ BRAZIL(Santa Catarina).

9. Neoempheria borgmeieri Edwards,1940

1940. Edwards, Novit. Zool. 42:113, 1 female (?), Pl.I,fig.12(wing) ------ BRAZIL(Santa Catarina).

It is possible that then the male of this species is found, a new group may be erected. The wing, as figured by Edwards, shows several perhaps significant differences in its pattern in comparison with the wing of species in any of the groups presently known. Wing pattern has proved to be an excellent character for group differentiation.

maculipennis group

The ocellar bristles long, reaching forward to or nearly to base of antennae; antenna with first flagellar segment shorter than scape plus pedicel, apical dorsal seta of pedicel longer than first flagellar segment. Pleura with dark oblique stripe from wing base to base of forecoxa; postnotum with dorsal transverse stripe which extends onto and suffuses base of pleurotergite and basal posterior margin of mesoepimeron. Wing with Sc_2 ending at or slightly before base of Rs, Sc bare or with a few apical setae; cell R_5 at least three of four times as long as wide, subequal to M_{1+2}; M_1, M_4, Cu and Cu1 completely setose or bare near base, M_2 bare; posterior fork basad of fR; a narrow dark band from below R_{4+5} through fM_{1+2}, basal cell with dark spot at base, costal cell suffused apically at least, apex hyaline or large light or hyaline areas apically in cell R_5 and M_1. Eighth tergite subtrapezoidal, the median posterior margin convex, setose; anterior margin broadly emarginate; the lateral margins abruptly narrowed before posterior margin or not. Eighth sternite subtriangular, posterior margin truncate, setose; anterior margin widely and shallowly emarginate; lateral margins abruptly or slightly narrowed before posterior margin. Terminalia with outer style compressed, subtriangular, with "porose" area on median lateral surface at sternal angle; subaedeagal rod U-shaped; tergal portion with patch of setulae basad of large lateral setae; anal segment short.

This group corresponds to Edwards' Group D.

10. _N._ _varipennis_ (L-A.),1892.

11. _N._ _maculipennis_ Williston,1896.

12. _N._ _bradleyi_ Edwards,1940.

13. _N._ _panamensis_ n.sp.

14. _N._ _bidentata_ n.sp.

15. _N._ _lanei_ Edwards,1940.

16. _N._ _tetraphaea_ Shaw,1940.

17. _N._ _ecuadorensis_ n.sp.

18. _N._ _glochis_ n.sp.

19. _N._ _mulleri_ Edwards,1940.

20. _N._ _flavicoxa_ Edwards,1940.

21. _N._ _plaumanni_ Edwards,1940.

22. _N._ _puncticoxa_ Edwards,1940.

23. _N._ _horrens_ n.sp.

24. _N._ _subhorrens_ n.sp.

25. _N._ _acidoti_ n.sp.

26. _N._ _zeteki_ n.sp.

10. Neoempheria varipennis (Lynch-Arribalzaga), 1892.

1892. Empheria varipennis Lynch-Arribalzaga, Bol. Acad. Nac. Cienc., Cordoba 12:423, male, Pl.I, fig.12 (wing), Pl.II, fig.4 (habitus) -- ARGENTINA (Misiones).

1892. Neoempheria varipennis Lynch-Arribalzaga, Bol. Acad. Nac. Cienc., Cordoba 12:472 -- transferred to Neoempheria.

1900. Hunter, Trans. Amer. Ent. Soc. 26:275 -- Catalogue.

1902. Neoempheria variipennis, Kertesz, Cat. Dipt. 1:66 -- misspelling.

1909. Mycomya variipennis, Johannsen, Genera Insectorum 93:51.

1940. Edwards, Novit. Zool. 42:126, txt.fig.6a (male terminalia) -- BRAZIL (Santa Catarina).

Differences noted in my specimens from the description given by Edwards are: base of M_1 weak. In addition, acrostichal area and bare areas on either side light, dorsocentral area broadly infuscated, oval light area obscured; TII with dark antero-lateral saddle, TIII dark with light lateral area, TIV to TVI darker above, TVII darkest anteriorly; terminalia of Rio Negro specimen with inner style slightly narrower in relation to length. A photograph of the wing is presented for the first time (Pl. I).

Female: Differs from the male specimens examined by me as follows: mesonotum with slight suggestion of median dark line, light oval mark in dorsocentral area well-defined. Abdomen with TIII dark and succeedingly smaller light postero-lateral angles on TIV to TVI, TVII dark.

Additional records: BRAZIL:- State of Parana: male and female, Rio Negro, April 23,1945(M. Witte); State of Santa Catarina, 1 male, Nova Teutonia, Oct.29,1938(F. Plaumann).

Observations: There is some discrepancy in the two wing drawings of Lynch-Arribalzaga, the venation on Plate I not matching that of the decidedly Neoempheria type of the second drawing on Plate II.

The allotype designation is not made in hope that a more nearly topotypic specimen can be obtained.

11. Neoempheria maculipennis Williston,1896.

1896. Williston, Trans. Ent. Soc. London 1896:262, 4 males, Pl.VIII, fig.16(wing) ---- ST. VINCENT, W.I.

1900. Hunter, Trans. Amer. Ent. Soc. 26:275 -- catalogue.

1902. Kertesz, Cat. Dipt.1:65.

1909. Mycomya (Neoempheria) maculipennis, Johannsen, Genera Insectorum 93:48.

1940. Edwards, Novit. Zool. 42:118, txt.fig.6d(male terminalia) - lectotype designated.

12. Neoempheria bradleyi Edwards,1940.

1940. Neoempheria maculipennis bradleyi Edwards, Novit. Zool. 42:118, 1 male, txt.fig.6e(male terminalia) ----- PERU(La Sombra, Putumayo District).

In consideration of the imperfect knowledge of this genus and the single specimen from which this form was named, I feel that its position as a subspecies is debatable and untenable, therefore I consider it to be of specific rank. Knight and Mattingly (1950) say "believing that it takes more evidence to create a subspecies than it does a species, namely, evidence showing isolation (geographical or otherwise) to occur ------- given specific status here."

I have examined the holotype terminalia and find that they are intermediate in form between maculipennis and sulleri.

13. Neoumpheria panamensis n.sp.

Male: Head with vertex and occiput yellow-brown, area laterad ocelli light; postfrons brownish; prefrons and clypeus light; anteclypeus setiferous except for longitudinal median portion; antenna with scape, pedicel and base of first flagellar segment light, flagellar segments dark; palpus dark.

Thorax: anterior pronotum light; posterior pronotum, postspiracular plate and paratergite light; apex of postspiracular plate suffused; mesonotum variable but generally with a narrow dorso-central brown stripe with an elongate ovoid area between it and sublateral brown stripe; scutellum light with short, fine, setae laterad, dorsad and mesad of scutellar setae; coxae and femora variably suffused brown; wing 3.5mm.(Pl. 1).

Abdomen: TI dark dorsally; TII antero-dorsal dark saddle; TIII dark with narrow, light posterior margin; TIV subtriangular-shaped antero-dorsal dark saddle; TV light posterior margin, broader laterally; TVI as for V with lateral area broader; TVII dorsal dark saddle, variable.

Terminalia: (fig1); tergal portion with apical process a flattened hook, lateral margin produced somewhat to form a depression between it and apical process; lateral apical surface produced medianly, sparsely setiferous; strongest setae on outer margin, half-way from base, a few setae basad of this, others scattered distad on lateral surface; notched on median distal margin; sternal portion with inner style apically pointed, bearing a few fine setae and with two blunt processes one-third and two-thirds distance from apex on inner irregularly serrate margin, basal process longer, blunt, curved, inner process short, bifid, finely pilose, variable in depth of bifidity; parameres with L-shaped sclerotized portion, rest membranous; SIX divided to base, apex truncate, bare.

Holotype: PANAMA:- Canal Zone, Barro Colorado: Oct.-Nov.1941 (J.Zetek).
Paratopotypes: 18 with same data as holotype.
Paratypes: PANAMA:- 3 males, El Cermeno, Aug.1941 (J.Zetek); 1 male, Cano Saddle, Gatun L., May 3,1923 (R.C. Shannon).

Observations: This species is closely related to maculipennis and differs from that species principally in the nature of the bifid inner process of the terminalia. It is possible that this is the same species as Williston's since one of the paratypes has a shallowly bifid inner process. This condition approaches the simple form of this process in *maculipennis*. It is of interest to note that all the specimens except that from Gatun L. are recorded as being reared from the bracket fungus, *Fomes*.

14. *Neoempheria bidentata* n.sp.

Male: Head with vertex and occiput yellow-brown; postfrons yellowish with dark apex; prefrons yellowish, apically suffused; postclypeus yellowish; anteclypeus yellowish, the basal angles suffused and bearing long brownish setae; antenna with scape, pedicel and base of first flagellar segment light, the flagellum dark; palpi reddish-brown.

Thorax: anterior pronotum light; posterior pronotum, postspiracular plate and paratergite yellowish; apex of postspiracular plate suffused; mesonotum with dorso-central brown stripe fused apically with sublateral brown stripe, a light ovoid area in fused portion; scutellum light with short fine setae lateral and mesad of scutellar setae; postnotum with a median dorsal brown area not forming the usual band with pleurotergal marking; hind coxa with a slight median lateral brown marking; wing 4mm. (Pl. 1).

Abdomen: TI light antero-dorsal saddle; TII with dark antero-dorsal saddle; TIII with very small antero-dorsal light area and suggestion of light posterior margin; TIV with anterior 3/5 dark; TV with a posterolateral light area connected by a narrow median dorsal light band; TVI as for TV but not connected medianly; TVII dark; sternites yellow.

Terminalia: (fig.2,5); closely resembling that of panamensis, tergal portion less concave at base of apical process; inner style with two blunt processes midway, basal one longer, blunt, curved; inner process deeply bifid.

Holotype: ARGENTINA:- Province of Salta: Embarcacion, Feb.2-6,1950 (R. Goldbach).

Observations: This species is closely related to maculipennis and panamensis. It differs from them principally in the form of the inner style and the shape of the bifid inner process. N. bidentata is more heavily suffused along the costal margin of the wing.

15. *Neoempheria lanei* Edwards,1940

1940. Edwards, Novit. Zool. 42:115, 1 male - holotype, 2 females, txt. fig.4b(male terminalia); Pl.II,fig.15(wing) ------ BRAZIL(Sao Paulo).

The Panama specimens differ from the original description in the following ways: narrow dark acrostichal stripe present; elongate light area between dorsocentral and sublateral dark stripes; mesoepimeron light apically; pleurotergite as for group description; midcoxa slightly suffused laterally. Abdomen with anter-dorsal saddle on TI and TII, TIII with narrow apical light band, TIV with very small antero-dorsal saddle, TV with postero-lateral angles light and barely meeting medianly, TVII dark. Inner style of terminalia with process somewhat larger.

Additional records: PANAMA:- Canal Zone: 1 male, Barro Colorado, Oct.-Nov.1941 (J. Zetek); 1 male, El Cermeno, Aug.1941 (J. Zetek).

Observations: The El Cermeno specimen is so dark that the pleural stripe is not evident. The inner process of the sternite is more deeply bifid in the El Cermeno specimen. Both specimens were reared from Fomes.

16. Neoempheria tetraphaea Shaw,1940.

1940. Shaw, Rev. Ent. 11:805,807, 1 male,fig.(male terminalia) ----- COSTA RICA(Rivas, Valley of the General, 2875').

I have seen the type. This species is closely related to N. lanei and N. ecuadorensis n.sp. It may be told from the former by the narrower inner style and the pattern of the wing, especially the clouding in the fork of M_{1+2}; see wing (Pl. 1).

The setose veins bear setae only apically, differing somewhat in this from other species of the group.

17. Neoempheria ecuadorensis n.sp.

Male: Head brownish, anteclypeus with setae scattered laterally which are at least half as long as clypeus; antenna with scaperand pedicel yellowish, flagellar segments brown; palpi fuscous, terminal segment yellow.

Thorax: anterior pronotum brownish; posterior pronotum, postspiracular plate and paratergite yellowish; posterior margin of postspiracular plate suffused; mesonotum with pattern obscured by general brownish coloration, a light acrostichal and dorso-central stripe and a light pre-alar spot; light portion of pleurotergite whitish; scutellum light with short fine setae dorsad, mesad and laterad of scutellar setae; fore coxa brown, mid and hind coxae laterally suffused; wing 4mm. (Pl. 1).

Abdomen: TI with postero-dorsal dark saddle emarginate anteriorly; TII antero-dorsal dark saddle with small light antero-dorsal spot; TIII dark with a very narrow light posterior margin; TIV narrow antero-dorsal saddle; TV and TVI dark with a light triangular postero-lateral area; TVII dark medianly.

Terminalia: (figs.4,5); tergal portion with apical process flattened, wider basally, hook-like, apex only slightly curved, lateral margin not produced apically; base widened mesally distad of large setae; setae from below process on lateral surface to level of apex of anal segment; basal portion widely and shallowly notched on distal margin; sternal portion with inner style broad, flattened, flared at tip, apex emarginate, a large blunt curved median process midway; inner process short, flattened, folded, the dorsal apical portion prolonged into a fine sharp-pointed, medianly projecting process, pilose; parameres largely sclerotized, dorsal sub-apical portion membranous, apices bowed medianly; subaedeagal rod V-shaped with basal nipple; SIX divided to base, apex truncate, bare.

Holotype: ECUADOR:- Province of Napo-Pastaza: Abitagua, March 18,1940 (Clark Macintyre).

Observations: There is a female on the same pin as the type, probably taken in copulation with the male. The condition of this specimen is too poor to be designated as the allotype. This species is extremely close in relationship to tetraphea and lanei, differing mainly in the the development of the inner style and the shape of the inner process. The wing is more extensively marked than either of the two previously described species.

This species was captured at 1100 meters.

18. Neoempheria glochis n.sp.

Male: Head with vertex and occiput yellow-brown to brown; postfrons yellowbrown to brown, attenuated portion darker than basal portion; prefrons, postclypeus and anteclypeus creamy to yellow, anteclypeus with scattered setae laterad, setae as long as width of base; palpi generally fuscous with or without light markings, terminal segment lighter.

Thorax: anterior and posterior pronotum, postspiracular plate and paratergite yellowish, apex of postspiracular plate suffused; mesonotum highly variable. narrow dark acrostichal and dorsocentral stripe, the latter fused with the sublateral stripe, a light ovoid spot in fused area; scutellum whitish to yellowish with short fine setae dorsad and laterad of scutellar setae; fore coxa brown, mid and hind coxae suffused laterally; Sc_2 present or absent, Sc bare or with a few apical setae; apex of M_2 atrophied; wing 3 to 3.5mm. (Pl. 1).

Abdomen: TI dark dorsal saddle; TII antero-dorsal saddle extending 5/8 way posteriorly; TIII dark; TIV ark antero-lateral saddle and lateral margin; TV small postero-lateral light area; TVI as for TV but light area smaller; TVII dark.

Terminalia: (figs.6,7); tergal portion with apical process flattened, gently hooked, lateral margin not produced; lateral apical surface produced medianly, sparsely setiferous; strongest setae on outer margin half way from base, a few setae basad of these, others scattered distad on lateral surface; median base notched on distal margin; inner style flattened, a large curved spur mid-way on inner margin, angulated subapically the distal portion broad with a slightly emarginate apical margin and with a spur-like terminal process; inner process bifid, finely pilose; parameres with band-shaped sclerotised portion spiraling from ventral base to dorsal apex, remainder membranous; SIX divided to base, apex truncate, bare.

Holotype: PANAMA:- Canal Zone: Barro Colorado, Oct.-Nov.1941 (J. Zetek).

Paratopotype: 1 male with same data as holotype.

Paratype: COSTA RICA:- San Mateo: 1 male, Higuito (P. Schild).

Observations: This species is most closely related to lanei and ecuadorensis differing from these species by the shape of the inner style, inner process and paramere. It is probable that the unforked condition of Sc is abnormal since Sc_2 is present in the genus as a whole and in one of the three specimens of this species. The specimens from Panama were reared from Fomes.

19. Neoempheria Mulleri Edwards,1940.

1940. Edwards, Novit. Zool. 42:116, 4 males holotype, 3 females, txt. fig.6c(male terminalia); Pl.II,fig.16(wing) ----- BRAZIL(Santa Catarina).

The Sao Paulo specimen has the following combination of characters which differ or are in addition to the characters in the original description: ground color of body reddish-yellow; dorsal postnotal band narrowly interrupted laterally; oval sublateral light spot of mesonotum not evident; TII antero-dorsal saddle; no posterior yellow marking on TIV; fore coxa with a basal oval brownish spot, mid and hind coxa with no markings; Sc with a few apical setae.

Additional records: BRAZIL:- State of Sao Paulo: 1 male, Rio Parana, Porto Cabral, March 20-31,1944 (Travassos, Carrera and Dente).

20. Neoempheria flavicoxa Edwards,1940

1940. Edwards, Novit. Zool. 42:115, 1 male-holotype, 2 females, txt. fig.4b(male terminalia); Pl.II,fig.15(wing) ----- BRAZIL(Santa Catarina).

21. Neoempheria plaumanni Edwards,1940.

1940. Edwards, Novit. Zool. 42:114, many males - holotype, many females, txt.fig.4a(male terminalia); Pl.II,fig.15(wing) ----- BRAZIL (Santa Catarina)

My specimens differ from the original description in the following ways: the topotypic specimen has a light ground color; second specimen with a reddish cast; hind femora somewhat suffused; Sc bare; TI with postero-dorsal dark, saddle: TII light antero-lateral corner, remainder dark.

Additional records: BRAZIL:- State of Sao Paulo: 1 male, Faz. Rondonea, Praia Grande, Jan.1945 (M. Carrera); 1 topotypic male, Oct.20,1938 (F. Plaumann); 1 topotypic male, Oct.11,1938 (F. Plaumann).

29. Neoempheria puncticoxa Edwards,1940.

1940. Edwards, Novit. Zool. 42:115, 1 male - holotype, 1 female, txt. fig.5(male terminalia) ----- BRAZIL(Santa Catarina).

My specimens differ from or have in addition to the characters in the original description the following combination of characters: specimens well-marked, the mesonotal pattern with acrostichal dorsocentral and sublateral stripes distinct in all specimens except the one from Santo Amaro; pleural markings more distinct in females; postnotal band sometimes represented by a median spot; fore coxa with U-shaped mark on anterior surface, a prolongation of pleural stripe, better developed on males except for Santo Amaro specimen; wing (Pl. 1); TI with postero-dorsal saddle; TII antero-dorsal saddle; TIII antero-lateral corners and narrow posterior margin light; TIV antero-dorsal saddle; TV narrowly light posteriorly; TVI and TVII dorsal dark saddle widest anteriorly; tip of inner style truncate when viewed from laterally.

Additional records: BRAZIL:- State of Sao Paulo: 1 male, March,1949 (J. Lane); 1 male, Feb.,1950 (Lane); male and female in copula, Feb. 26, 1950 (Lane and Coher); 1 male, Guianazes, Feb.1950 (M. Carrera); 1 male, Sao Jose Campos, Jan.1937 (H.S. Lopes); State of Maracaju, Mato Grosso: 1 male, June 1937 (R.C. Shannon); ARGENTINA:- Province of Salta: 1 male, Tartagal, Feb.7-12,1950 (R. Goldbach); 1 male, Aguaray, Feb.14-19,1950 (R. Goldbach); 1 male, Urundel, Feb.25-31,1950 (R. Goldbach); Province of Tucuman: 1 male and 2 females, Tucuman, March 1949 (Wygodzinsky).

Observations: The Tucuman specimens were taken at a light. The Santo Amaro specimens were taken in flight in copula during the day. On the basis of wing pattern and fore coxal pattern punctícoxa seems to be related to the following three new species, although they are more nearly related to each other than to this species. The setation of the tergal portion of the terminalia seems to be stronger in the following species than in any of the previously studied species in this group.

23. Neoempheria horrens n.sp.

Male: Head with vertex and occiput yellow-brown; postfrons laterally yellow, attenuated portion brown; prefrons, postclypeus and anteclypeus yellow, latter with basal lateral angles infuscated, bearing fine setae laterally which are as long as apical width of anteclypeus; antenna with scape and pedicel yellow, flagellar segments brownish, lighter below; palpi fuscous.

Thorax: anterior and posterior pronotum, postspiracular plate and paratergite yellow; mesonotal pattern well-developed, dorsocentral stripes weakest; scutellum brownish with short fine setae dorso-laterad of scutellar setae; fore coxa with U-shaped mark on anterior surface, a prolongation of pleural stripe; Sc bare; wing 5mm. (Pl. 1).

Abdomen: TI small light antero-dorsal saddle; TII antero-dorsal dark saddle; TIII light antero-lateral corners and a light dorsal postero-median area; TIV dorsal dark saddle not quite reaching to posterior margin; TV variable, one side with antero-lateral light area, dark portion reaching half-way to lateral margin - other side with a basal lateral dark stripe in addition, dark dorsal portion not reaching very far ventrad; TVI antero-dorsal dark saddle; TVII antero-dorsal dark saddle with a light median line and a narrow dark posterior margin; TVIII (fig.8) with narrow posterior setiferous margin; SVIII (fig.9).

Terminalia: (figs.10,11); tergal portion with apical process flattened, hook-like, apex slightly bent laterally; lateral margin produced nearly to apex of process to form a deep concavity between them, process with a few setulae; lateral subapical surface produced medianly, setiferous; lateral surface setose to below large setae, distad of which lateral margin is abruptly emarginate; median base notched widely on median distal margin; inner style subcylindrical, elbowed mid-way, apically with two or three peg-like setae, a few subapical, basal supporting process prolonged to form a short mesal spur; inner process long, flattened, pointed and reaching halfway to elbow of inner style, pilose; paramere large, apically pointed and resembling half a pecan shell; aedeagus broad and broadly rounded apically; subaedeagal rod with apices of U broadly flared; SIX divided to base, apex truncate, bare.

Holotype: ARGENTINA:- Province of Salta: Aguaray, Feb.14-19,1950 (R. Goldbach).

Observations: This species is most closely related to the following new species subhorrens. These two species can be distinguished from each other only on the basis of the shape of the aedeagus and the shape of the tergal portion of the terminalia.

24. Neoempheria subhorrens n.sp.

Male: Head with vertex, occiput and postfrons yellow-brown; prefrons, postclypeus and anteclypeus yellow, the latter with setae in basal angles and laterally, the setae about half as long as basal width of anteclypeus; antenna with scape, pedicel and first flagellar segment yellow (rest missing); palpi fuscous.

Thorax: anterior and posterior pronotum, postspiracular plate and paratergite yellow, apex of postspiracular plate suffused; mesonotum with pattern faded so that only sublateral stripes are well-marked; scutellum brownish dorso-medianly and with a large cluster of setae dorsad and laterad of scutellar setae; fore coxa as in horrens; Sc bare; wing 5mm. (Pl. 1).

Abdomen: TI medianly cleft postero-dorsal dark saddle; TII antero-dorsal dark saddle more deeply cleft medianly than TI; TIII posterior margin dark - suggestion of a dorsal saddle with a light median stripe; TIV lateral margin dark, small deeply cleft antero-dorsal saddle; TV dorsal, posterior and lateral margins dark with a median dorsal light stripe which is wider posteriorly; TVI very small deeply cleft antero-dorsal saddle; TVII yellowish; sternites yellowish; TVIII (fig.12) broadly rounded posterior setiferous margin; SVIII (fig.13).

Terminalia: (fig.14); like horrens except for the following: apical process of tergal portion not as broad; lateral margin produced only about one-third length of process; aedeagus (fig.15) narrow, apically pointed.

Holotype: COSTA RICA:- San Mateo: Higuito (P. Schild).

Observations: This species is closely related to horrens. They may be separated on the basis of the form of the apical process and the shape of the aedeagus. The wing markings of subhorrens are not so extensive as those of horrens in cell R_5. The form of the eighth tergite is distinctive in both species.

25. Neoempheria acidoti n.sp.

Male: Head with vertex and occiput brownish; postfrons yellow-brown; prefrons, postclypeus and anteclypeus yellowish, and latter with setae in basal angles and laterally, the setae about one-fourth as long as basal width of anteclypeus; antenna with scape and pedicel yellow.

flagellum yellow-brown; palpi fuscous.

Thorax: anterior and posterior pronotum, postspiracular plate and paratergite yellow; apex of postspiracular plate suffused; mesonotum with pattern well-developed but not dark, anterior postion of dorso-central stripe absent; scutellum suffused dorso-medianly and with a large cluster of short fine setae dorsad and laterad of scutellar setae; fore coxa with U-shaped mark on anterior surface, a prolongation of pleural stripe; Sc bare; wing 5 mm. (Pl. 1).

Abdomen: entirely a more-or-less transparent reddish-yellow-brown, probably not normal appearance.

Terminalia: (figs.16,17); tergal portion with apical style about 3/5 as long as basal portion, subcylindrical, apex bent ventrally; lateral margin produced one-fifth length of style to form a deep concavity between them; broadened gradually from below base of style; lateral surface setose to below large setae; median base notched widely on median distal margin; inner style flattened, clubbed apically with a median elbow, basal portion subcylindrical with a flattened flared spur on inner surface basad of elbow, basal supporting process prolonged to form a short, flattened mesal process which is also fused with inner process; paramere shaped like half a pecan but with a swollen dorsal portion which is lightly sclerotized on dorsal surface; inner process long, flattened, pointed and reaching elbow of inner style; SIX divided to base, short, apex truncate, bare.

Holotype: PERU:- Cerro Azul: Loreto, April 28,1947 (Schunke).

Observations: This species is most closely related to horrens and subhorrens. It is easily separable from those species by the form of the tergal portion of the terminalia as well as the shape of the inner style and its accessory median process. Other differences are evident in the wing pattern. All three species have a dark fore coxal pattern and a median process at the base of the inner style of the terminalia.

26. Neoempheria zeteki n.sp.

Male: Head with vertex, occiput and postfrons yellow; prefrons, postclypeus and anteclypeus light yellow, the latter with scattered setae as long as apical width of anteclypeus; antenna with scape and pedicel yellowish, flagellar segments variable, generally brownish with varying amounts of yellow on basal segments, ventrally and lateraaly on distal segments; palpi variable from light yellow-brown to red-brown or combinations of these.

Thorax: anterior and posterior pronotum, postspiracular plate and paratergite yellow; mesonotum with dark well-developed pattern, intermediate light areas bare and supraalar area whitish; pleural stripe light to dark; scutellum light, suffused medianly or not and with many small setae dorsad and laterad of scutellar setae; Sc bare; Cu variable but at least apical half setose; wing 5 mm. (Pl. 2).

Abdomen: TI dark postero-dorsal saddle; TII dark antero-dorsal saddle;

TIII dark with antero-lateral angle and small portion of dorsal posterior margin light; TIV dark antero-dorsal saddle a dark spot sometimes present on median posterior portion; TV dark with antero-lateral angle and small portion of dorsal posterior margin light; TVI dark dorsal saddle; TVII variable.

Terminalia: (figs.18,19); tergal portion with apical style about two-fifths as long as basal portion, subcylindrical, apex bent ventrally; lateral margin produced one-fourth length of style to form a concavity between it and style; broadened gradually from below base of style; lateral surface setose to below large setae; median base slightly notched on median distal margin; inner style flattened, clubbed apically, a median elbow bearing a broad blunt process, the basal portion twisted and supporting process prolonged to form a short pointed mesal process; inner process flattened, deeply bifid, reaching halfway to elbow of inner style; paramere shaped like half an elongate ovoid body, sclerotized basally; subaedeagal rod with basal nipple; SIX divided to base, broad, overlapping medianly apically, apex truncate, bare.

Holotype: PANAMA:- Canal Zone: Barro Colorado, Oct.-Nov.1941 (J. Zetek).

Paratopotypes: 11 males with same data.

Observations: Most closely related to <u>horrens</u> and <u>subhorrens</u> from which it is easily distinguished on the basis of the shape of the inner style and the forked inner process as well as the tergal portion of the terminalia.

ornatipennis group

Two ocellar bristles long, reaching forward to or nearly to base of antennae; antenna with first flagellar segment barely shorter than scape plus pedicel, apical dorsal seta of pedicel longer than first flagellar segment. Pleura with dark oblique stripe from wing base to base of fore coxa, sometimes faint; postnotum with dorsal transverse stripe which extends onto and suffuses base of pleurotergite and basal posterior margin of mesoepimeron. Wing with Sc_2 ending at, slightly before or slightly beyond base of Rs, Sc bare or setose apically; cell R_3 twice as long as wide, subequal to or longer than M_{1+2}; M_1, M_4, Cu and Cu_1 completely setose or bare near base, M_2 bare; posterior fork basad of fR; a narrow dark band from below R_{4+5} through fM_{1+2}, basal cell hyaline or with faint basal infuscated spot, costal cell hyaline except at extreme tip, apex lightly suffused. Eighth tergite subtrapezoidal, the posterior margin convex with a median sparsely setose portion; anterior margin emarginate. Eighth sternite subtriangular, posterior margin truncate, setose; anterior margin concave; lateral margins slightly narrowed before posterior margin. Terminalia with outer style compressed, elongate subrectangular, "porose" area subapical; subaedeagal rod U- or Y-shaped; tergal portion with patch of setulae basad of large lateral setae; anal segment short.

This group corresponds to Edwards' Group E.

27. *N. ornatipennis*(Enderl.),1911.

28. *N. evanescens*(Enderl.),1911.

29. *N. bifida* n.sp.

30. *N. separata* n.sp.

31. *N. kästneri* Edwards,1940.

32. *N. subclavata* Edwards,1940.

33. *N. fallax* n.sp.

34. *N. subfallax* n. sp.

35. *N. lüderwaldti* Edwards,1940.

36. *N. smarti* Edwards,1940.

37. *N. larifuga* n.sp.

38. *N. enderleini* Edwards,1940.

39. *N. philippsi* Shaw,1940.

40. *N. longiseta* n.sp.

41. *N. goiana* n.sp.

42. *N. unispinosa* Edwards,1940.

43. *N. flavicornis* Edwards,1940.

44. *N. rostrata* Edwards,1940.

45. *N. pilosa* Edwards,1940.

27. Neoempheria ornatipennis (Enderlein),1911.

1911. Neurocompsa ornatipennis Enderlein, Stettin. Ent. Zeit. 72:159, 1 male - type, fig.1(wing) ----- BRAZIL(Santa Catarina) -- type of Neurocompsa.

1940. Edwards, Novit. Zool. 42:119, 3 males, txt.fig.7a(male terminalia), Pl.II,fig.19(wing) ----- BRAZIL(Santa Catarina, Sao Paulo) -- new combination, re-examined type and re-described species.

Three additional specimens studied vary from each other in coloration although mainly agreeing with the description of the species. One specimen with basal half of antennal flagellum light; second with posterior portion of acrostichal stripe well-developed; all specimens with TV and TVI with light posterior margin; hind femur suffused only on Argentine specimen.

Additional records: BRAZIL:- State of Sao Paulo: 1 male, Cajuru, Feb.1947 (M. Barretto); State of Bahia: 1 male, Piraja, July 21, 1929 (R.C. Shannon); ARGENTINA:- Province of Salta: 1 male, Urundel, Feb.25-31,1950 (R. Goldbach).

Observations: All specimens agree with the description in the presence of a thickened sinuous fold in cell R_5.

28. Neoempheria evanescens (Enderlein),1911.

1911. Pleonazoneura johannseni var. evanescens Enderlein, Stettin. Ent. Zeit. 72:158, 4 males, 1 female ----- BRAZIL(Santa Catarina).

1940. Edwards, Novit. Zool. 42:121, txt.fig.7b(male terminalia) -- new combination. Validated as species and lectotype designated, redescription of Enderlein's material. Of the original male cotypes, one became the type of enderleini and one the type of lüderwaldti.

29. Neoempheria bifida n.sp.

Male: Head with vertex, occiput and postfrons yellow-brown, attenuated portion of latter suffused; prefrons, postclypeus and anteclypeus yellow, the latter with a few scattered setae laterally which are as long as apical width of anteclypeus; antenna with scape and pedicel yellow, basal segment of flagellum lighter than apical segments; palpi fuscous.

Thorax: anterior and posterior pronotum, postspiracular plate and paratergite yellow; mesonotum with dorsocentral stripes developed only posteriorly, sublateral stripes poorly defined; acrostichal setae narrowly separated by bare stripe form dorsocentrals; scutellum darker above with short fine setae dorsad and laterad of scutellar setae; wing 3.5mm. (Pl. 2).

Abdomen: TI dark dorsal saddle; TII antero-dorsal saddle not quite reaching posterior margin; TIII antero-lateral angle light; TIV small antero-dorsal saddle; TV dark with minute light area at lateral anterior angle; TVI dark, somewhat lighter at antero-lateral angle.

Terminalia: (figs.20,21); tergal portion with apical process deeply bifid, outer portion tipped with short stout setae, inner portion bare;

lateral surface strongly folded ventrally, bearing long setae laterally mid-way on base, a few setae scattered distad of these on dorsal surface, lateral apical margin setose, mesal margin with long fine setae; median apical margin of base appears to be deeply notched but may be simply torn at that point; inner style subcylindrical, broader at base, widening and bifid apically, a group of long stout setae just above base laterally, base of setae with small flattened processes whose size is apparently determined by the size of the seta; inner process short, flattened, pointed apically; paramere broad, scoop-shaped; subaedeagal rod broadly U-shaped; SIX apically pointed, bare.

Holotype: ARGENTINA:- Province of Salta: Aguaray, Feb.14-19,1950 (R. Goldbach).

Observations: This species is closely related to evanescens and kästneri. The new species is easily separated from those two species and all other species in the genus by the bifid condition of both the apical process of the tergal portion of the terminalia and that of the inner style.

30. Neoempheria separata n.sp.

Male: Head with vertex, occiput and postfrons yellow-brown; remainder yellow; antennae missing; palpi fuscous.

Thorax: anterior and posterior pronotum, postspiracular plate and paratergite yellow; mesonotum with pattern poorly developed, sublateral stripes present and only a small dark posterior portion of fused acrostichal and dorsocentral stripes remaining; scutellum dark above with short fine setae dorsad of larger setae; Sc bare; wing 4mm. (Pl. 2).

Abdomen: TI dark dorsal saddle; TII antero-dorsal dark saddle; TIII light antero-laterally; TIV yellowish but with hint on antero-dorsal dark spot; TV dark with postero-lateral margin partially light; TVI dark with postero-lateral light area; TVII yellow.

Terminalia: In poor condition but so unusual that a reconstructed drawing (figs.22,23) gives the salient features which include: peculiar flattened and lobed shape of the inner style, the distal and lateral lobes with short apical peg-like setae, the median lobes elongate, bare; SIX short with a small medianly projecting fingerlike process; tergal portion with pointed subcylindrical apical process as long as basal portion; outer style with obliquely truncate apex.

Holotype: COSTA RICA:- San Mateo; Higuito (P. Schild).

Observations: This species is most closely related to kästneri and evanescens but may be easily separated from both those species by the form of the inner style. separata has SIX like that of evanescens but differs in the form of the apical tergal process. The tergal process of separata resembles that of kastneri but SIX is quite different, the latter species not having the median finger-like process.

31. Neoempheria kästneri Edwards, 1940.

1940. Edwards, Novit. Zool. 42:121, 4 males - holotype formerly paratype of Pleonazoneura johannseni End., txt.fig.8a(male terminalia ----- BRAZIL(Santa Catarina).

All specimens agree closely with the original description. A single difference noted in the terminalia is that the base of the apical process of the tergal portion is a flattened lobe, not a general widening of the basal portion as indicated in Edwards' drawing. The Brazilian specimen has a darker head.

Additional records: BRAZIL:- State of Sao Paulo: 1 male, Cajuru, Feb.1947 (M. Barretto); ARGENTINA:- Province of Salta: 1 male, Tartagal, Feb.7-12,1950 (R. Goldbach), Province of Tucuman: 1 male, Aconquija, Dec. 8-10,1950 (R. Goldbach).

32. Neoempheria subclavata Edwards, 1940.

1940. Edwards, Novit. Zool. 42:121, 2 males - holotype, txt.fig.8b (male terminalia) ----- BRAZIL(Santa Catarina).

33. Neoempheria fallax n.sp.

Male: Head with vertex, occiput and postfrons brownish; prefrons, postclypeus and anteclypeus yellow to brownish, the latter with scattered setae like those on penultimate segment of palpus; antenna with scape and pedicel yellowish, basal half of flagellum yellowish-brown, apical half brownish; palpi fuscous.

Thorax: anterior and posterior pronotum, postspiracular plate and paratergite yellow; mesonotum with acrostichal and sublateral developed, dorsocentral stripe developed only posteriorly; acrostichal setae poorly differentiated from dorsocentrals; scutellum dark dorsally, numerous short fine setae laterad, dorsad and mesad of scutellar setae; mesoepimeron with basal posterior margin suffused or not; wing 8.5mm. (Pl. 2).

Abdomen: TI dark dorsal saddle; TII antero-dorsal dark saddle; TIII antero-lateral corner light; TIV antero-dorsal dark saddle; TV antero-lateral light area; TVI dorsal dark saddle; TVII postero-dorsal dark saddle; TVIII variable in number of marginal setae.

Terminalia: (figs.24,25); tergal portion with apical prosess narrow subcylindrical, subequal to basal portion, setae laterally from wide basal lobe of apical process halfway to apex and scattered setulae distad of those; mesal margin of base with scattered setulae and a group of large setae midway on lateral margin of base; base divided medianly; anal segment half as long as basal portion, longer than in other species of group except <u>subclavata</u> and <u>kästneri</u>; inner style elbowed midway, basal half flattened apical half subcylindrical, subapically swollen, apically nipple-like and setiferous; inner process flattened, pointed and reaching elbow of inner style, pilose; paramere broad, subovoid scoop-shaped; subaedeagal rod narrowly Y-shaped; SIX apically truncate, oblique and overlapping medially, bare.

Female: like male, TVI and TVII darker.

Holotype: BRAZIL:- State of Sao Paulo: 1 male, Sao Paulo, March 1, 1950 (E. Coher).

Allotype: BRAZIL:- State of Sao Paulo: 1 female, Santo Amaro, Feb.26, 1950 (J. Lane and E. Coher). Female on same pin as male paratype.

Paratopotype: 1 male with same data as holotype. Head missing.

Paratype: ARGENTINA:- State of Jujuy: 1 male, Palpala, Jan.12-Feb.15, 1949. Male taken in copula with allotype.

Observations: This species is very closely related to subclavata and differs from that species only in the form of the inner style. Comparison with specimens of subclavata may reveal further differences. The pair in copula were taken in flight during the day.

34. Neoempheria subfallax n.sp.

Male: Head with vertex and occiput yellowish-brown; postfrons yellowish with attenuated portion brown; prefrons, postclypeus and anteclypeus yellowish the latter with setae laterally like those on palpi; antenna with scape, torus and base of first flagellar segment yellowish, remainder of flagellum fuscous; palpi fuscous.

Thorax: anterior and posterior pronotum, postspiracular plate and paratergite yellow; mesonotum with acrostichal and sublateral stripes developed only posteriorly, acrostichal setae poorly differentiated from dorsocentrals; scutellum dark above, numerous short fine setae laterad, dorsad and mesad of scutellar setae; wing 5mm. (Pl. 2); much of legs missing.

Terminalia: (fig.26); apparently exactly as for fallax but with the inner process shaped differently; inner process nearly reaching apex of inner process.

Holotype: BRAZIL:- State of Sao Paulo: Boracea, Nov.1947 (Rabelo-Travassos F.).

Observations: This species is closely related to fallax. The species may be separated by the form of the inner style and the relationship of the inner process to the inner style.

35. Neoempheria lüderwaldti Edwards,1940.

1940. Edwards, Novit. Zool. 42:121, 1 male(formerly a cotype of Pleonazoneura johannseni var. evanescens Enderlein), txt.fig.8a(male terminalia);Pl.II,fig.20(wing) ----- BRAZIL(Santa Catarina).

Additional records: BRAZIL:- State of Sao Paulo: 1 male, Cajuru, Feb. 1947 (M. Barretto).

36. Neoempheria smarti Edwards,1940.

1940. Edwards, Novit. Zool. 42:123, 1 male, txt. fig.9c(male terminalia) ----- BRITISH GUIANA.

37. Neoempheria larifuga n.sp.

Male: Head with vertex and occiput yellow-brown; postfrons brown; prefrons, postclypeus and anteclypeus yellow, latter with lateral setae like smaller setae on ventral scape and pedicel; antenna with scape and pedicel yellow, flagellum with basal fourth to half lighter than brown apical portion; palpi fuscous.

Thorax: anterior and posterior pronotum, postspiracular plate and paratergite yellow; mesonotum with dorsocentral stripes developed only posteriorly, acrostichal and sublateral stripes well-developed; acrostichal setae poorly differentiated from dorsocentrals; Peruvian specimen with acrostichal and dorsocentral stripes reduced, represented by a median posterior spot; scutellum with short fine setae dorsad, laterad and mesad of the scutellar setae; Sc bare; wing 4mm. (Pl. 2).

Abdomen: TI dark dorsal saddle; TII antero-dorsal dark saddle not quite reaching posterior margin; TIII antero-lateral angles light; TIV small antero-dorsal dark saddle; TV dark; TVI variable, but generally darker dorsally than laterally.

Terminalia: (figs.27,28); tergal portion with apical process cylindrical, compressed subapically, apex curved and flattened with two fine setae; setae scattered along mesal margin; median distal margin of base with a shallow weakened area; outer style obliquely truncate; inner style complex, trifid, base large, lateral process with irregular rows of peg-like setae along apical margin, a lateral seta just above basal portion; middle portion subcylindrical, slender, slightly curved, apex even with that of outer portion; inner portion a short, somewhat flattened lobe; inner process flattened, pointed apex reaching to level of lateral setae on inner style, pilose; paramere subovoid; subaedeagal rod broadly U-shaped; subaedeagal plate with median posterior subrectangular sclerite; SIX short, broad with medially projecting finger-like process.

Female: like the male, acrostichal stripe present; TV light antero-lateral corners.

Holotype: ARGENTINA:- Province of Salta: 1 male, Aguaray, Feb.14-19, 1950 (R. Goldbach).

Allotype: PERU:- Cerro Azul; 1 female, Loreto, April 30,1947 (Schunke). Female taken in copula with male paratype - on same pin.

Paratopotypes: 9 with same data as holotype.

Paratypes: ARGENTINA:- Province of Salta: 5 males, Tartagal, Feb.7-12,1950 (R. Goldbach); PERU:- 1 male with same data as allotype - on same pin.

Observations: This species is intermediate in form of the terminalia between lüderwaldti and smarti. The tergal portion of the terminalia resembles that of lüderwaldti and the sternal portion resembles that of smarti, Edwards' species also apparently having the peculiar form of the subaedeagal plate. There is some variation in the outer process of the inner style, i.e. there may be two lateral setae or some of the terminal peg-like setae may be displaced and take on a sublateral position.

38. Neoempheria enderleini Edwards,1940.

1940. Edwards, Novit. Zool. 42:122, 2 males (holotype formerly cotype of Pleonazoneura johannseni var. evanescens End.) txt.fig.9b(male terminalia) ----- BRAZIL(Santa Catarina).

Additional records: BRAZIL:- State of Sao Paulo: 1 male, Cajuru, Feb.1947 (M. Barretto); ARGENTINA:- Province of Salta: 1 male, Tartagal, Feb.7-12,1950 (R. Goldbach).

Observations: Although there are some differences in the terminalia of my specimens from the drawings of Edwards, for the present I consider that we had the same species before us. In my specimens, the apex of M_4 does not turn up.

39. Neoempheria philippsi Shaw,1951.

1940. Neoempheria neivai Shaw, Rev. Ent.11:808, 1 male, fig.7(male terminalia) ----- COSTA RICA(Pedregoso). Homonym.
1951. Neoempheria philippsi Shaw, Psyche 58:148 --- new name.

I have examined the type of this species. It is closely related to the following two new species.

40. Neoempheria longiseta n.sp.

Male: Head with vertex and occiput yellowish-brown; postfrons brown; prefrons, postclypeus and anteclypeus yellow, latter with a few lateral setae like those on palpi; scape and pedicel yellow, basal third to half of flagellum lighter than brown apical portion; palpi fuscous.

Thorax: anterior and posterior pronotum, postspiracular plate and paratergite yellow; apex of postspiracular plate suffused; mesonotum with acrostichal and sublateral stripes developed, acrostichal stripe only poorly and dorsocentral stripe only posteriorly if at all; acrostichal setae well or poorly differentiated from dorsocentrals; pleurotergite not suffused basally; scutellum darker dorsomedianly and with short fine setae laterad, dorsad and mesad of scutellar setae; Sc with apical third or half setiferous; wing 4-mm. (Pl. 2).

Abdomen: TI dark dorsally; TII dorsal dark saddle not quite reaching posterior margin; TIII antero-lateral light area; TIV dark antero-dorsal saddle; TV dark or with light antero-lateral corner; TVI dark.

Terminalia: (figs.29,30); tergal portion with narrow apical subcylindrical process about twice as long as basal portion, wide at base and with scattered setulae; basal portion abruptly widened mesally, basad of apical process and with a few scattered setae; lateral margin less abruptly widened with a few long setae midway; base divided at median apical margin in an inverted Y-shaped form; outer style rounded apically; inner style apically subcylindrical, pointed, medianly greatly flattened and elbowed, a clump of setae distad of elbow as long as apical portion of style, setiferous on flattened portion and basad of elbow with a flattened spur with rounded apex; basal portion as long as apical portion, subcylindrical and wider than apical portion; inner process flattened, pointed and reaching to apex of paramere; paramere disk-like, broader apically; subaedeagal rod Y-shaped; subaedeagal plate with a distal subtrapezoidal process which is distally emarginate or not; SIX rounded apically, bare.

Holotype: ARGENTINA:- Province of Salta: Aguaray, Feb.14-19,1950 (R. Goldbach).

Paratopotype: 1 male with same data.

Paratype: ARGENTINA:- Province of Salta: 1 male, Tartagal, Feb.7-12, 1950 (R. Goldbach); 1 male, Urundel, Feb. 25-31,1950 (R. Goldbach); BRAZIL:- State of Sao Paulo: 1 male, Cajuru, Feb.1947 (M. Barretto).

Observations: This species is closely related to philippsi. The new species may be told from Shaw's species by the shape of the inner style. The setae on the inner style of the Brazilian specimen are more nearly equal to the apical portion of the style than the setae of the other specimens. Also, the Brazilian specimen has the comb between the spurs on the midleg poorly developed and the pleurotergite is not suffused basally.

41. Neoempheria goiana n.sp.

Male: The description of this species is exactly like that of longiseta except for the following: apex of postspiracular plate not suffused; mesonotum with poorly developed pattern, acrostichal and dorsocentral stripes appearing as a spot posteriorly; acrostichal setae poorly differentiated from dorsocentrals; Sc with apical third setose; minor differences in wing pattern 4.5-mm. (Pl. 2); TV dark; terminalia with tergal process somewhat finer; inner style(fig.31) not so broadened at elbow, large setae about one-half as long as apical portion of style and flattened spur more deeply cut; subaedeagal plate(fig.32) with median portion more heavily sclerotized.

Holotype: BRAZIL:- State of Goiaz: Corumba, Nov.1945 (M. Barretto).

Observations: This species is most closely related to longiseta and is differentiated from that species only by the form of the inner style and the subaedeagal plate.

42. Neoempheria unispinosa Edwards,1940.

1940. Edwards, Novit. Zool. 42:123, 1 male, txt.fig.10a(male terminalia) BRAZIL(Santa Catarina).

43. Neoempheria flavicornis Edwards,1940

1940. Edwards, Novit. Zool. 42:123, 1 male, txt.fig.10b(male terminalia) BRAZIL(Santa Catarina).

44. Neoempheria rostrata Edwards,1940.

1940. Edwards, Novit. Zool. 42:124, 1 male, txt. fig.10c(male terminalia) BRAZIL(Santa Catarina).

45. Neoempheria pilosa Edwards,1940.

1940. Edwards, Novit. Zool. 42:124, 2 males, txt.fig.10d(male terminalia) BRAZIL(Santa Catarina).

lindneri group

Two ocellar bristles long, reaching forward to base of antennae; antenna with first flagellar segment shorter than scape plus pedicel, apical dorsal seta of pedicel longer than first flagellar segment. Pleura yellow, with or without a small dark spot anterior to wing base; postnotum with transverse V-shaped stripe removed from base and which extends onto and suffuses base of pleurotergite. Wing with Sc_2 ending at or slightly before base of Rs, Sc setose along apical half; cell R_5 twice as long as wide, subequal to or longer than M_{1+2}; M_1, M_4, Cu and Cu_1 completely setose or bare near base, M_2 bare; posterior fork basad of fR; a narrow dark band from below R_{4+5} through fM_{1+2}, basal cell hyaline or suffused, costal cell hyaline except at extreme tip apex infuscated. Eighth tergite subtrapezoidal, the posterior margin convex with a median sparsely setose portion; anterior margin emarginate. Eighth sternite subtriangular, posterior margin truncate, setose; anterior margin concave; lateral margins slightly narrowed before posterior margin. Terminalia with outer style subcylindrical, "porose" area subapical; subaedeagal rod Y-shaped; tergal portion with patch of setulae basad of large lateral setae; anal segment short.

This is a new group. lindneri has been taken from Edwards' Group F, the remainder of the group consisting of new species and cincta Shaw.

46. _N._ _lindneri_ Edwards,1940.

47. _N._ _cincta_ Shaw,1940.

48. _N._ _levir_ n.sp.

49. _N._ _sublevir_ n.sp.

46. Neoempheria lindneri Edwards,1940.

1940. Edwards, Novit. Zool. 42:125, 1 male, txt.fig.11a(male terminalia); Pl.I,fig.6(wing) ------ BRAZIL(Santa Catarina).

47. Neoempheria cincta Shaw,1940.

1940. Shaw, Rev. Ent. 11:806, 1 male, fig.5(male terminalia) ------ COSTA RICA(Valley of the General, 2925').

I have seen the holotype of this species. Wing (Pl. 3).

48. Neoempheria levir n.sp.

Male: Head with vertex, occiput and postfrons yellow-brown, attenuated portion of postfrons brown; prefrons, postclypeus and anteclypeus yellow, latter with a few setae laterally which are somewhat longer than those on palpi; antenna with scape, pedicel and first two antennal segments yellowish, remainder brownish; palpi fuscous.

Thorax: pleura yellowish; mesonotum with pattern well-developed, dorsocentral stripe fading anteriorly; setae poorly differentiated; scutellum brown mesally, short fine setae laterad, dorsad and mesad of scutellar setae; wing 3.5mm. (Pl. 3).

Abdomen: TI dark dorsal saddle; TII dark antero-dorsal saddle; TIII antero-lateral angle light; TIV small median antero-dorsal saddle; TV and TVI dark; TVII light.

Terminalia: (figs.33,34); tergal portion with a narrow somewhat flattened apical process which is about twice as long as basal portion setuliferous; basal portion with long setae midway at lateral margin; setulae along mesal margin; swollen and flattened inner process apically with elbow about one-third distance from base, a spur on outer angle, three peg-like setae apically and two long setae midway on distal portion; scattered setulae; inner process flattened, pointed and reaching to bend of inner style, pilose; paramere subovoid; SIX rounded apically, bare.

Holotype: PERU:- Cerro Azul: Loreto, April,22,1947 (Schunke).

Observations: This species is closely related to lindneri and may be told from that species only by the shape of the inner style which has a strong elbow with a spur on the median angle. It would appear that the apical setae are shorter than those in lindneri but I cannot be sure of this since I have not seen lindneri.

49. Neoempheria sublevir n.sp.

Male: The description of this species is exactly like that of levir except for the following: only first flagellar segment yellowish; anepisternite not suffused; dorsocentral stripe of mesonotum not developed; postnotal band not reaching lateral margin and no suffusing basally on pleurotergite; Sc with apical third setose; wing 5-mm. (Pl. 3); TIV suggestion of a small antero-dorsal saddle; TVI antero-dorsal saddle reaching nearly to posterior margin.

Terminalia: (figs.35,36); inner style with apical setae as long as greatest width of apical swollen portion, long setae nearly as long as swollen portion, outer angle of elbow deeply emarginate forming spur.

Holotype: PANAMA:- Canal Zone: Summit, Nov.1946 (N.L.H. Krauss).

Observations: This species is closely related to levir. They may be separated with certainty only by characters of the terminalia, particularly the shape of the inner style. Knowledge of the group appears to indicate that the coloration characteristics of the thorax will prove to be sufficient for separation from levir and lindneri. The elbowed shape of the inner style and the spur at the elbow are the characters which separate this species from lindneri.

portoricensis group

Ocellar bristles long, reaching forward to base of antennae; first flagellar segment shorter than scape plus pedicel, apical dorsal seta of pedicel longer than first flagellar segment. Pleura with dark oblique stripe from wing base to base of fore coxa; postnotum with transverse, subdorsal, broadly V-shaped stripe which extends onto and suffuses base of pleurotergite and basal porterior margin of meso-epimeron. Wing with Sc_2 ending at or just beyond base of Rs, Sc setose apically; cell R_5 twice as long as wide, longer than M_{1+2}; M_1, M_4, Cu and Cu_1 setose, M_2 bare; posterior fork basad of fR; mostly hyaline below R_{4+5}, a narrow dark band from below fRs through fM_{1+2} along M_2, basal cell hyaline, costal cell hyaline; apex infuscated. Eighth tergite subtrapezoidal, the posterior margin convex with a median sparsely setose portion; anterior margin emarginate. Eighth sternite subtriangular, posterior margin truncate, setose; anterior margin concave; lateral margins slightly narrowed before posterior margin. Terminalia with outer style subcylindrical, "porose" area subapical; subaedeagal plate with emarginate posterior margin; subaedeagal rod Y-shaped; tergal portion with patch of setulae basad of large lateral setae; anal segment long.

This is a new group.

50. N. portoricensis n.sp.

50. *Neoempheria portoricensis* n.sp.

Male: Head with vertex and occiput brownish; postfrons fuscous; prefrons, postclypeus and anteclypeus yellowish or brownish, latter with lateral setae like those apically on palpus; scape, pedicel and base of first flagellar segment yellowish or brownish yellow, flagellum brownish; palpus fuscous.

Thorax: anterior and posterior pronotum, postspiracular plate and paratergite yellowish; apex of postspiracular plate suffused; mesonotum with pattern well-developed, paratype damaged; scutellum with short fine setae dorsad and laterad of scutellar setae; wing 3.5mm. (Pl. 3).

Abdomen: TI dark dorsally; TII antero-dorsal dark saddle; TIII, TV and TVI with antero-lateral light area; TIV dark medianly; TVII dark.

Terminalia: (figs.37,38); tergal portion with apical process narrow, subcylindrical, about twice as long as basal portion, bent apically and somewhat thickened at bend, setuliferous; basal portion gently widened with several long setae midway at lateral margin, median posterior margin divided widely; inner style elbowed medianly, a rounded, apically flattened lobe distad of elbow and subcylindrical beyond lobe, three apical peg-like setae, several below these and six on lobe; base stout and subcylindrical; inner process flattened, pointed, not reaching apex of paramere; paramere large, subrectangular, swollen ventrally; SIX rounded apically, bare.

Female: Unknown.

Holotype: PEURTO RICO:- Mayaguez, Nov.17,1950.

Paratopotype: 1 male, May 12,1936 (G.S. Tulloch).

Observations: This species is so far most closely related to <u>cincta</u>, however, it is easily distinguished from that species on the basis of wing pattern and the form of the terminalia. The paratype specimen is in rather poor condition. The holotype collected "at bait on Mango tree".

johannseni group

Ocellar bristles reaching beyond prominence; antenna with first flagellar segment subequal to scape plus pedicel, apical dorsal seta of pedicel barely longer than first flagellar segment. Pleura yellowish; postnotum with dorsal transverse stripe which extends onto and suffuses base of pleurotergite. Wing with Sc_2 ending at base of Rs, Sc setose apically; cell R_5 twice as long as wide, slightly longer than M_{1+2}; M_1, M_4, Cu, and Cu_1 setose, M_2 bare; posterior fork basad of fR; a narrow dark band from below R_{4+5} through fM_{1+2}, basal cell hyaline, costal cell hyaline except at extreme tip apex infuscated. Eighth tergite subtrapezoidal, posterior margin setose; anterior margin emarginate. Eighth sternite subtriangular, posterior margin truncate, setose; anterior margin concave; lateral margins narrowed well before posterior margin or not. Terminalia with outer style subcylindrical (specimens not seen to validate this character); anal segment short.

This is a new group. It includes two of the species Edwards placed in his Group F.

51. *N. johannseni* (Enderl.), 1911.

52. *N. shannoni* Edwards, 1940.

51. Neoempheria johannseni (Enderlein),1911.

1911. Pleonazoneura johannseni Enderlein, Stettin. Ent. Zeit.72:156, 2 males, 1 female ----- BRAZIL(Santa Catarina). Type of Pleonazoneura. 1940. Edwards, Novit. Zool. 42:126, txt.fig.11b(male terminalia).--- new combination. Lectotype designated.

52. Neoempheria shannoni Edwards,1940.

1940. Edwards, Novit. Zool. 42:125, 1 male - holotype, 1 female, txt. fig.11c(male terminalia); Pl.I,fig.3(wing) ----- BRAZIL(Santa Catarina).

costa-limai group

Ocellar bristles reaching beyond prominence; antenna with first flagellar segment subequal to scape plus pedicel, apical dorsal seta of pedicel barely longer than first flagellar segment. Pleura yellowish; postnotum with dorsal transverse stripe which extends onto and suffuses base of pleurotergite. Wing with Sc_2 ending just before, at or just beyond base of Rs; Sc apically or with apical half setose; cell R_3 not twice as long as wide, little more than half as long as M_{1+2}; M_1, M_4, Cu and Cu_1 completely setose or bare near base, M_2 bare; posterior fork basad of fR; a narrow dark band from below R_{4+5} through fM_{1+2}, most of base of cell M_1 dark, basal cell hyaline, costal cell hyaline apex suffused. Eighth tergite subtrapezoidal, posterior margin setose; anterior margin emarginate. Eighth sternite subtriangular and truncate or subrectangular; posterior margin setose or lateral corners setose or not setae; anterior margin concave. Terminalia with outer style narrow, subcylindrical, "porose" area at apex; subaedeagal rod small, U-shaped; tergal portion without basal patch of setulae; anal segment short.

This is a new group. It includes one of Edwards' species from Group F and three new species.

53. N. costa-limai Edwards, 1940.

54. N. dziedzickii n.sp.

55. N. comes n.sp.

56. N. socia n.sp.

53. Neoempheria costa-limai Edwards, 1940.

1940. Edwards, Novit. Zool. 42:126, 3 males - holotype, txt.fig.12a (male terminalia); Pl.II,fig.23(wing) ------ BRAZIL(Santa Catarina).

54. Neoempheria dziedzickii n.sp.

Male: Head with vertex, occiput and postfrons yellow-brown, somewhat lighter in front of oceller prominence; prefrons, postclypeus and anteclypeus yellowish, latter wider than long with scattered setae subequal to length; antenna with scape, pedicel and base of first flagellar segment yellowish, remainder brown; palpi fuscous.

Thorax: pleura yellow, no dark marking on anepisternite, pleurotergite with basal suffused portion; mesonotum with pattern weakly developed, acrostichal stripe fading anteriorly, setae poorly differentiated; scutellum suffused, two short fine setae laterad of and two longer fine setae meso-dorsad of scutellar setae; postnotum comb on midleg short; entirely suffused; wing 4mm. (Pl. 3).

Abdomen: TI dark; TII antero-lateral corner light; TIII dark with small light anter-lateral angle; TIV small antero-dorsal saddle; TV and TVI dark; TVII light.

Terminalia: (figs.39,40); tergal portion twisted apically with subapical peg-like setae, a transverse ridge below this with longer heavy setae and some finer ones, a mesad projecting lobe below this and narrower below lobe; most of setae placed below narrow portion and above long setae which are laterally situated at widest part of base; widely connected medianly; inner style ensiform, bare; inner process subovate, pilose; paramere with median subdeltoid-shaped sclerite, remainder flattened, curved and apically pointed; SIX forceps-like, bare.

Holotype: BRAZIL:- State of Sao Paulo: Boracea, Sept.1947 (J. Lane).

Observations: This species is most closely related to costa-limai from which it may be distinguished by the setation of the tergal portion of the terminalia, the shape of the paramere and the form of sclerite at the base of the paramere.

55. Neoempheria comes n.sp.

Male: A single specimen agreeing with dziedzickii in most respects but in poor condition so that setation and pattern of mesonotum are obscured; scutellar setae missing; postnotum dark dorsally; Sc with distal half setose; cell R_5 completely dark; wing 5mm. (Pl. 8).

Abdomen: TI darker posteriorly and anteriorly; TII mottled; TIII dark; TIV like TII with light posterior band; TV and TVI dark; TVII light.

Terminalia: (figs.41,42); tergal portion like that of dziedzickii but with base strongly folded ventrally and subapical row of strong setae longitudinal rather than transverse; anal segment long; inner style subcylindrical with a mesal flattened basal lobe, somewhat forceps-like, bare; inner process flattened, pointed, pilose; paramere with median subdeltoid-shaped sclerite remainder subovate, pointed apically; SIX forceps-like, pointed apex not strongly bent medianly.

Holotype: COSTA RICA:- San Mateo: Higuito, no date (F. Schild).

Observations: This species is closely related to dziedzickii and may be separated from that species by the form of the terminalia and the pattern of the wing. The paramere, inner style and inner process are the most distinctive portions of the terminalia for separating the two species.

56. Neoempheria socia n.sp.

Male: A single specimen agreeing with dziedzickii in most respects but with the following differences: setae on anteclypeus shorter; basal antennal segments lighter than distal portion; pleura reddish-yellow; acrostichal stripe only developed anteriorly; dorsocentral stripes developed as a V-shaped mark posteriorly; sublateral stripe developed only posteriorly; acrostichal setae separated narrowly from dorsocentrals which are more widely separated from sublaterals; scutellum with some small setae mid-dorsally; postnotum lighter than pleura; combs on mid and hind tibiae sparse; Sc irregularly setose; wing 3.5mm. (Pl. 3); TI dorsal saddle; TII antero-dorsal saddle; remainder dark, mottled.

Terminalia: (figs.43,44); agreeing in most respects with that of comes but tergal portion with an apical nipple; slight difference in median basal sclerite of paramere; apex of style relatively broader.

Holotype: BRAZIL:- State of Goiaz: Corumba, Nov.1945 (M. Barretto).

Observations: This species is closely related to _comes_ and _dziedzickii_ with the most distinguishing characteristic being the apex of the tergal portion of the terminalia which has an apical nipple.

biflagellata group

Ocellar bristles reaching beyond prominence; antenna with first flagellar segment subequal to scape plus pedicel. Pleura yellow; postnotum with transverse V-shaped stripe removed from base, base of pleurotergite suffused by lateral extension of postnotal stripe. Wing with Sc_2 ending just before, at or just beyond base of Rs; Sc setose apically or bare; cell R_3 not twice as long as wide, about two-thirds as long as M_{1+2}; M_1, M_4, Cu and Cu_1 setose, M_2 bare; posterior fork basad of fR; a narrow dark band from below R_{4+5} through fM_{1+2}, no light area in fork, basal cell hyaline, costal cell with tip suffused apex suffused. Eighth tergite subtrapezoidal, posterior margin setose; anterior margin emarginate. Eighth sternite subtriangular, apex rounded, setose, slightly narrowed subapically; anterior margin concave. Terminalia with outer style subcylindrical, "porose" area subapical; subaedeagal rod U-shaped, base very wide; subaedeagal plate absent; tergal portion without basal patch of setulae; anal segment short.

This is a new group and contains one species formerly in Edwards' Group F.

57. N. biflagellata Edwards,1940.

57. Neoempheria biflagellata Edwards,1940.

1940. Edwards, Novit. Zool. 42:127, 1 male, txt.fig.12b(Male terminalia); Pl.II,fig.24(wing) ----- BRAZIL(Santa Catarina).

My specimen differs from the original description in the following ways: head darker; scape, pedicel a nd base of first flagellar segment of antenna light; dorsocentral stripe weakly indicated; postnotal stripe removed from base; comb on midleg poorly developed between spurs; terminalia with inner style compressed, broad with a double row of apical setae. I believe that Edwards has shown this process from a dorsal view.

Additional records: BRAZIL:- State of Sao Paulo: 1 male, Jaragua, Feb.1951 (J. Lane).

jugalis group

Two ocellar bristles long, reaching forward to base of antennae; first antennal segment subequal to scape plus pedicel. Pleura yellowish; postnotum with faint dorsal transverse stripe which extends onto and suffuses base of pleurotergite. Wing with Sc_2 ending before base of Rs; Sc bare; cell R_3 twice as long as wide, not quite as long as M_{1+2}; M_1, M_4, Cu and Cu_1 setose, M_1 and M_4 with extensive bare area basally, M_2 bare; posterior fork basad of fR; a narrow dark band from below basal half of R_{4+5} through fM_{1+2}, basal cell hyaline, costal cell slightly suffused apex suffused. Eighth tergite subtrapezoidal, posterior margin setose; anterior margin emarginate. Eighth sternite subtriangular, apex rounded, setose, slightly narrowed subapically; anterior margin concave. Terminalia with outer style subcylindrical, "porose" area subapical; subaedeagal rod Y-shaped; subaedeagal plate narrow, band-shaped; tergal portion without basal patch of setulae; anal segment long.

This is a new group.

58. N. jugalis n.sp.

58. Neoempheria jugalis n.sp.

Male: Head with vertex, occiput and postfrons yellow-brown, attenuated portion of postfrons brown; prefrons, postclypeus and anteclypeus yellow-brown, latter wider than long with scattered setae like those on palpi; antenna with scape, pedicel and first flagellar segment light, remainder brown, apical dorsal seta of pedicel as long as first flagellar segment; palpus fuscous.

Thorax: pleura yellow, anepisternite suffused basally; mesonotum with dorsocentral stripe poorly developed, acrostichal setae narrowly separated from dorsocentrals which are more widely separated from sublaterals; scutellum with short fine setae dorsad and laterad of scutellar setae; postnotum suffused; comb on midleg sparse between spurs; wing 3-mm. (Pl. 3).

Abdomen: TI small light lateral area; TII dark dorsal saddle not quite reaching posterior margin; TIII light antero-lateral angle; TIV dorsal saddle reaching two-thirds distance to posterior margin; TV and TVI dark; TVII somewhat lighter than V and VI.

Terminalia: (figs.45,46); tergal portion with apical style subcylindrical pointed, curved mesally and setuliferous, about one-half as long as basal portion; basal portion widely connected medianly with two long setae at widest point with scattered setulae distad of these; outer style subcylindrical, apically constricted; inner style bifid, one portion flattened with apical peg-like setae, second portion subovate, flattened, bare; inner process flattened, pointed pilose; paramere subovate; SIX apically emarginate.

Holotype: BRAZIL:- State of Sao Paulo: Morumbi, Nov.1,1949 (I. Ortiz).

Observations: This species superficially resembles shannoni from which it is easily told by the form of the terminalia.

<u>faceta</u> group

Ocellar bristles reaching beyond prominence; antenna with first flagellar segment shorter than scape plus pedicel, apical dorsal seta of pedicel slightly longer than first flagellar segment. Pleura yellow; postnotum with dorsal transverse V-shaped stripe which extends onto and suffuses base of pleurotergite and posterior margin of meso-epimeron. Wing with Sc_2 ending at base of Rs; Sc setose apically; cell R_3 twice as long as wide, subequal to M_{1+2}; M_1, M_4, Cu and Cu_1 setose, M_1 and M_4 with extensive bare area basally, M_2 bare; posterior fork basad of fR; a narrow dark band from below R_{4+5} to fM_{1+2}, basal cell hyaline, costal cell suffused apically apex suffused. Eighth tergite subtrapezoidal, posterior margin setose, anterior margin emarginate. Eighth sternite subtriangular, truncate, posterior margin setose, anterior margin concave. Terminalia with outer style subspatulate, apically compressed, "porose" area subapical; subaedeagal rod Y-shaped; subaedeagal plate absent; tergal portion without basal patch of setulae; anal segment long, about one-half as long as tergal portion.

This is a new group.

59. <u>N.</u> <u>faceta</u> n.sp.

59. Neoempheria faceta n.sp.

Male: Head with vertex, occiput and postfrons yellow-brown; prefrons, postclypeus and anteclypeus yellow, latter with scattered setae like those on palpi; antenna with scape, pedicel and first two flagellar segments yellow, rest brown; palpi fuscous.

Thorax: pleura yellow except where postnotal band suffuses pleurotergite and mesoepimeron; mesonotal pattern strongly developed, acrostichal setae narrowly separated from dorsocentrals which are well-separated from sublaterals; scutellum suffused dorsally, short fine setae dorsad and laterad of scutellar setae; wing 4mm. (Pl. 3).

Abdomen: TI postero-dorsal saddle; TII dorsal median saddle not quite reaching posterior margin; TIII antero-lateral angles yellow; TIV small antero-dorsal saddle; TV and TVI dark; TVII yellow.

Terminalia: (figs.47,48,49); tergal portion flattened, wide with a small setiferous apical style from median surface and short stout setae along apical margin; largest setae along lateral margin just above base and setiferous distad of these; narrowly joined mesally; inner style peculiarly shaped (fig.49); inner process flattened, pointed reaching to peg-like setae on inner style, pilose; paramere subovate; SIX with a lateral apical point.

Holotype: ARGENTINA:- Province of Salta: Aguaray, Feb.14-19,1950 (R. Goldbach).

Observations: This species superficially resembles shannoni but is easily separated from that species on the basis of the form of the terminalia. No species known to me has terminalia that approximate the type occuring in faceta.

costaricensis group

Two ocellar bristles long, reaching forward to base of antennae; antenna with first flagellar segment shorter than scape plus pedicel, apical dorsal seta of pedicel longer than first flagellar segment. Pleura yellowish; postnotum with dorsal stripe poorly developed, not extending laterally. Wing with Sc_2 ending at base of Rs, Sc setose apically; cell R_3 more than twice as long as wide, slightly longer than M_{1+2}; M_1, M_4, Cu and Cu_1 setose, M_2 bare; posterior fork basad of fR; hyaline area below R_{4+5}, dark narrow bands from r-m and fRs unite and pass through fM_{1+2}, basal cell hyaline, costal cell hyaline apex suffused. Eighth tergite subtrapezoidal, posterior margin setose, anterior margin emarginate. Eighth sternite subtriangular, posterior margin rounded, apically setose anterior margin concave. Terminalia with outer style subcylindrical, apically compressed, "porose" area subapical; subaedeagal rod Y-shaped; tergal portion with a basal patch of setulae; anal segment short.

This is a new group.

60. N. costaricensis n.sp.

60. <u>Neoempheria</u> <u>costaricensis</u> n.sp.

Male: Head with vertex, occiput and postfrons yellow-brown, attenuated portion of latter brownish; prefrons, postclypeus and anteclypeus yellow, latter with a few short stout setae; antenna with scape, pedicel and a variable portion of the flagellum yellow, at least dark apically; palpi fuscous.

Thorax: pleura yellow; mesonotum with dorsocentral stripe poorly developed, setae poorly differentiated; scutellum with scattered short fine setae; comb between spurs of midtibia poorly developed; Sc setose on apical third; wing 4mm. (Pl. 4).

Abdomen: TI dark dorsal saddle; TII antero-dorsal saddle; TIII dark posteriorly; TIV small antero-dorsal saddle; TV and TVI dark; TVII lighter than TV and TVI.

Terminalia: (figs.50,51); tergal portion with apical process bifid, one arm longer than other, setulose; basal portion broadly widened, large setae midway on lateral margin, (outer style subcylindrical,,apically compressed, slightly widened basally); inner style apically flattened and expanded, a shoe-like apical style and a fine mesal spur based of expanded portion, a clump of short fine setae at lateral apex; inner process short, flattened and pointed, pilose; paramere subtriangular, widened dorsally; subaedeagal plate with a distal subtrapezoidal process; SIX elongate, apically rounded.

Holotype: COSTA RICA:- San Mateo: Higuito (P. Schild).

Paratopotype: same data.

Observations: This species resembles, except for pleural markings, subclavata. It is distinguishable from that species by the form of the terminalia, the bifid tergal style alone being enough to separate the species.

vogeli group

Ocellar bristles long, not reaching base of antennae; first flagellar segment longer than scape plus pedicel, apical dorsal seta of pedicel almost as long as first two flagellar segments. Pleura yellowish, lighter basally particularly anepisternite, or with longitudinal stripe below upper light area; postnotum darker laterally and mesally. Wing with Sc_2 ending at base of Rs, Sc bare; cell R_3 about twice as long as wide, barely half as long as M_{1+2}; M_1, M_4, Cu and Cu_1 setose, M_2 bare; posterior fork below or beyond fR; dark band from below R_{4+5} through posterior fork; basal cell hyaline, costal cell hyaline apex suffused. Eighth tergite subtrapezoidal, or triangular, without setae. Eighth sternite subrectangular with an emarginate posterior margin, each lateral lobe setiferous, or subtriangular posterior margin setiferous, anterior margin concave. Terminalia with outer style compressed, subovate (vogeli not seen), "porose" area apparently absent (vogeli not seen); subaedeagal plate broadly Y-shaped (vogeli not seen); anal segment short or long and deeply emarginate.

This group corresponds to Edwards' Group G.

61. N. vogeli Edwards, 1940.

62. N. lutzi Edwards, 1940.

61. Neoempheria vogeli Edwards,1940.

1940. Edwards, Novit. Zool. 42:127, 1 male, txt.fig.12c(male terminalia); Pl.I,fig.3(wing) ------ BRAZIL(Rio de Janeiro).

62. Neoempheria lutzi Edwards,1940.

1940. Edwards, Novit. Zool. 42:128, 1 female, Pl.I,fig.4(wing) ------ BRAZIL(Santa Catarina).

I have five males which I am referring to lutzi since they agree quite well with the description of the female of this species.

Head: vertex, occiput and postfrons yellow-brown or yellowish; profrons, postclypeus and anteclypeus yellowish, latter without setae; antenna with scape and pedicel yellowish, flagellum dark, basal segments sometimes lighter; palpi fuscous.

Thorax: pleura yellowish, pleurotergite and katepisternite darker; mesonotum with pattern poorly developed, setae poorly differentiated, a narrow bare space between dorsocentrals and sublaterals; scutellum suffused dorsally and laterally, short fine setae mesad of scutellar setae; postnotum slightly darker laterally and mesally; combs present but weakly developed; spur on foretibia small; M_1 sometimes incomplete at base.

Abdomen: TI darker dorsally; TII postero-dorsal saddle; TIII dark; TIV postero-dorsal saddle; TV dark; II and IV may have a median dark line.

Terminalia: (figs.52,53); tergal portion without any definite apical style, tapering from base, wide, flattened large setae laterally just above base with setae scattered distad of these to apex; widely joined; anal segment short; outer style subovate; inner style flattened, apically pointed forcep-like, a few scattered setae; inner process poorly developed, a dull spur; paramere cornucopia-shaped, basal half joined, a median apical pointed process; subaedeagal rod broadly Y-shaped; SIX short and apically rounded.

Allotype: BRAZIL:- State of Sao Paulo: 1 male, Boracea, Nov.1947 (E. Rabello).

Additional records: 1 male with same data as allotype; 2 males with same data (Rabello and Travassos F.); 1 male with same data, Aug.14, 1947 (Rabello, Travassos, Lane).

Observations: Although these males do not come from the type locality of the species, rather than consider them to be a new species I am describing them as the males of lutzi and designating an allotype. This procedure is dangerous in this genus considering the close morphological relationship of species in other groups already treated in this paper. However, this study has shown that species which occur in the State of Santa Catarina can and often do occur in the State of Sao Paulo.

rabelloi group

Ocellar bristles reaching nearly to base of antennae; antenna with first flagellar segment subequal to scape plus pedicel. Pleura yellowish; postnotum unicolorous except for two small lateral suffused spots. Wing with Sc_2 ending at base of Rs; Sc bare; cell R_3 more than twice as long as wide, more than half as long as M_{1+2}; M_1, M_4, Cu and Cu_1 setose, M_1 and M_4 with extensive bare area basally, M_2 bare; posterior fork below fR; a dark band from below R_{4+5} nearly fading before posterior fork, basal cell infuscated basally, costal cell hyaline; apex suffused. Eighth tergite subrectangular, without setae. Eighth sternite subtriangular, apically rounded and setose, posterior margin widely emarginate. Terminalia with outer style large, subovate, "porose" area apical; subaedeagal rod U-shaped; tergal portion without basal patch of setulae; anal segment with median portion much longer than remainder and deeply bifid.

This is a new group.

63. N. rabelloi n.sp.

63. Neoempheria rabelloi n.sp.

Male: Head with vertex, occiput and postfrons brown, yellowish laterad of ocellar prominence; prefrons, postclypeus and anteclypeus yellowish, anteclypeus without setae; antenna with scape and pedicel somewhat lighter than flagellar segments; palpi fuscous.

Thorax: pleura yellowish; mesonotal pattern not evident, suffused along lateral margin; acrostichal setae poorly separated from dorsocentrals which have a bare area between them and sublaterals; scutellum suffused laterally, no small setae; comb between spurs of midleg poorly developed; wing 4-mm. (Pl. 4).

Abdomen: with a median dark line slightly produced at anterior and posterior margins of segments II-VI; TVII emarginate medianly

Terminalia: (figs.54,55); tergal style as long as outer style, narrow, subcylindrical with scattered setae, those midway on lateral surface most densely clumped; base large, subtrapezoidal with a few setae laterally, a pair of long setae at base of tergal style and a median roughly T-shaped area with a distal circular apex; median portion of long anal segment deeply bifid; inner style short, subtriangular with two subapical setae; inner process about twice as long as inner style, broadly subtriangular, pilose; paramere large, peculiarly formed, fused along more than basal half with a pointed median apical process; SIX a median emarginate sclerite.

Holotype: BRAZIL:- State of Sao Paulo: Boracea, Nov.1947 (Rabelo-

Travassos).

Observations: This species is most closely related to vogeli. The new species may be distinguished from that species on the basis of the form of the terminalia and the pattern of the wing. The shape of the simple tergal style of this new species is the most distinctive difference from all other known species in the genus.

pereirai group

Ocellar bristles reaching beyond prominence; antenna with first flagellar segment shorter than scape plus pedicel, apical dorsal seta of pedicel longer than first flagellar segment. Pleura dark basally, light below including most of katepisternite and apex of pleurotergite; postnotum brownish. Wing with Sc_2 ending at base of Rs or slightly beyond; Sc bare; cell R_3 about twice as wide as long, half as long as M_{1+2}; M_1 apically and Cu and Cu_1 setose, M_2 and M_4 bare; posterior fork basad of fR; a broad dark band from below R_{4+5} through fM_{1+2} and barely distad of posterior fork; basal cell hyaline, costal cell suffused, particularly at apex; apex suffused, lighter marginally. Eighth tergite subtriangular, posterior margin setose, anterior margin emarginate. Eighth sternite subtriangular, posterior margin broadly rounded, setose, anterior margin deeply emarginate. Terminalia with outer style subcylindrical, "porose" area apparently absent; sub-aedeagal rod Y-shaped; tergal portion without basal patch of setulae; anal segment short and broad.

This group corresponds to Edwards' Group H.

64. *N. pereirai* Edwards, 1940.

65. *N. defleta* n.sp.

64. Neoempheria pereirai Edwards,1940.

1940. Edwards, Novit. Zool. 42:129, 1 female, Pl.I,fig.(wing) ----- BRAZIL(Mato Grosso).
1941. Edwards, Rev. Ent. 12:307, Pl.15,fig.3(wing) ----- same species described as new under same name.

65. Neoempheria defleta n.sp.

Male: Head brown; anteclypeus with a few setae like those on palpi; antenna brown; palpi fuscous.

Thorax: pleura brown except apex of pleurotergite and most of anepisternite; mesonotum with only sublateral stripe developed; acrostichal setae separated from dorsocentrals which are widely separated from sublaterals; scutellum brown with short fine setae laterad, dorsad and mesad of scutellar setae; wing 3.5mm. (Pl. 4).

Abdomen: TI darker above; TII antero-dorsal saddle, TIII dark; TIV with small antero-dorsal saddle, posterior margin dark; TV and TVI dark; TVII light.

Terminalia: (figs.56,57); tergal portion with apical style as long as outer style, subcylindrical, longest setae at base and setiferous distad of these; basal portion subrectangular, a row of setae along distal margin from base of style nearly to center; inner style short, subtriangular apically rounded, bare; inner process large, subovate; paramere peculiar in form with a sclerotized long sharp-pointed process, joined basally; subaedeagal rod closely appressed to basal portion of paramere, Y-shaped; SIX apparently not developed.

Holotype: BRAZIL:- State of Goiaz: Corumba, Nov.1945 (M. Barretto).

Observations: Although this species closely follows the description of pereirai which is known only from the female I am considering it to be a new species for the following reasons: there is some difference in the shape and pattern of the wing, defleta being darker in and above cell R_3 and with the apex of the light band at fM rather than just beyond. Smaller differences than these have proved to be specific in this genus. In addition most specimens from Goias have proved to be closely allied to species already described from Santa Catarina but not identical with the more southern forms.

paulensis group

Ocellar bristles reaching beyond prominence; antennae with apical dorsal seta of pedicel very long. Pleura yellowish; postnotum with dorsal transverse V-shaped stripe which extends onto and suffuses base of pleurotergite and mesoepimeron. Wing with Sc_2 ending just beyond base of Rs, Sc apically setose; cell R_5 about twice as long as wide, little more than half as long as M_{1+2}; M_1 bare near base, M_2, M_4 setose apically, Cu and Cu_1 setose; posterior fork basad of fR; hyaline below R_{4+5}, basal cell hyaline, costal cell with apex suffused; apex suffused. Eighth tergite subcrescentic in shape, a single median apical seta. Eighth sternite subtriangular, truncate, posterior margin setose, anterior margin deeply and widely emarginate. Terminalia with outer style small, subcylindrical, "porose" area apparently absent; subaedeagal rod Y-shaped, stem short; tergal portion without basal patch of setulae; anal segment short.

This is a new group.

66. N. paulensis n.sp.

66. Neoempheria paulensis n.sp.

Male: Head brown; anteclypeus with two setae little longer than those on palpi, others about half as long; antenna with flagellum broken and scape and pedicel brown; palpi fuscous.

Thorax: pleura yellow, anepisternite partially suffused; mesonotum with pattern well-developed, acrostichal stripe fading posteriorly; acrostichal setae well-separated from dorsocentrals which are well-separated from sublaterals; scutellum suffused dorsally with short fine setae laterad and dorsad of scutellar setae; postnotum suffused below band; forebasitarsus one-third longer than tarsus 2; wing 4mm (Pl. 4).

Abdomen: with a median dorsal dark stripe; TIII with posterior margin dark; TV with lateral margin broadly dark; TVI dark except for light oblique area from antero-lateral angle.

Terminalia: (figs.58,59); style of tergal portion extending to base, sub-lanceolate, broadly connected to large median basal portion which bears a group of long setae next to base of style; distal margin of base with a lateral peak-like process, setiferous below this in a quadrate area; median portion bare; inner style with short petiole, cup-like, trifid; inner process reaching tip of paramere, subtriangular, pilose; paramere forcep-like apically, fused along basal half; SIX forming a fused median lobe.

Holotype: BRAZIL:- State of Sao Paulo: Campos do Jordao, Aug.1949 (J. Lane).

Observations: This species does not seem to be closely related to any species in the genus. On the basis of wing pattern alone it is somewhat like the Nearctic species baliopter<u>a</u>.

<u>brasiliensis</u> group

Ocellar bristles reaching nearly to base of antennae; first flagellar segment subequal to scape plus pedicel, apical dorsal seta of pedicel as long as first two flagellar segments. Pleura lighter basally, particularly anepisternite; postnotum unicolorous, suffused. Wing with Sc_2 ending well before Rs, Sc bare; cell R_3 three times as long as wide, about two-thirds as long as M_{1+2}; M_1, M_4, Cu and Cu_1 setose; M_2 bare; posterior fork basad of fR; wide dark band below R_{4+5} barely touching fM_{1+2}, narrowed posteriorly and through posterior fork basal cell and cell M_2 basally infuscated, costal cell infuscated; apex infuscated, light spot distally in cell R_5. Eighth tergite subtrapezoidal, posterior margin setose, anterior margin concave with a median apex. Eighth sternite subquadrate, posterior margin setose, anterior margin deeply and widely emarginate. Terminalia with outer style subcylindrical, "porose" area apparently absent; subaedeagal plate I-shaped, notched basally; tergal portion without basal patch of setulae; anal segment moderately long, moderately emarginate.

This is a new group.

67. <u>N. brasiliensis</u> n.sp.

67. Neoempheria brasiliensis n.sp.

Male: Head brown, anteclypeus without setae; attenuated portion of postfrons fuscous; scape, pedicel and basal segments of antenna lighter than remainder of flagellum; palpi fuscous.

Thorax: pleura light above darker below, katepisternite, mesoepimeron and pleurotergite red-brown; mesonotum appearing red-brown, setae undifferentiated; scutellum lighter than mesonotum, short fine setae laterad and dorsad of scutellar setae; comb between spurs of mid and hind legs poorly developed; fermora brown; Sc_2 absent on one wing and poorly developed on second; wing 4.5mm. (Pl. 4).

Abdomen: TI with small postero-dorsal dark spot; TII-TIV with an antero-lateral light area; TV and TVI dark.

Terminalia: (figs.60,61); tergal style shorter than outer style, subcylindrical, subapically slightly swollen, long strong setae along median third, apical setae short and fine; basal portion widely connected medianly a tubercle with two long setae laterally on distal margin; outer style slightly wider above base, apical setae directed basad; inner style long, flattened and clubbed apically, setose; inner process absent; paramere flattened, subquadrate with a median sclerotized dorsal Y-shaped process, apices warty; subaedeagal rod notched basally, somewhat pointed distally; SIX with one long leg-shaped process with setulae and a shorter bare median truncate or emarginate process.

Holotype: BRAZIL:- State of Sao Paulo: Cantareira, Nov.1946 (M. Barretto).

Observations: This species is unusual in the pattern and shape of the wing if the concave nature of the costal margin is exaggerated by the slide mount, which I think it is not, the wing is still quite different in this respect from those of my other Neoempheria. This species is not close to any other species of the genus. Edwards' neivai or paulensis n.sp. are most closely related, however, there is really no great similarity.

NEARCTIC NEOEMPHERIA

The genus Neoempheria is poorly developed in the Nearctic region. The present study recognizes seven species. One new synonymy is proposed.

The history of the study of the Nearctic species is comparatively uncomplicated. Loew (1866) described Sciophila bimaculata from Canada. Since this name proved to be a homonym, Loew renamed the species and at the same time (1869) placed it with two new species in Empheria Winn., 1863. When Winnertz's genus was found to be a homonym, Osten-Sacken (1878) proposed the new name Neoempheria. Johannsen (1909) considered Neoempheria to be a subgenus of Mycomyia but one year later he recognized it as a separate genus and described four more species from the United States and Canada. A key to the species was included.

In recent years, Fisher (1937) described one more species which she later synonymized (1943) with N. didyma(Lw.). In the 1943 paper, she transferred Mycomyia flavohirta(Coq.),1901 to Neoempheria. In her paper with Shaw (1952), flavohirta is included in the key to Mycomyia. Finally, Tollet (1948) described a species from Baltimore, Maryland. He mentioned its close relationship to N. lineola(Mg.),1818, a European species and undoubtedly he has described a male of N. balioptera(Lw.).

Species originally described as Neoempheria are N. kincaidi Coq., 1900(=Hadroneura) and N. pullata Coq.,1904(=Dziedzickia). Johannsen (1909, 1910) was the first worker to place these species in their proper generic category.

A new key to the Nearctic species of Neoempheria is included below, some of the characters being used for the first time. Caution is advised when the wing pattern is relied upon for species identification. The infuscation of the wing, particularly that on the apical portion of the wing, is given only as a supporting character in the key.

The males of all species are readily separable by the form of the terminalia, although considerable variation appears in some of the species.

Key to the Species of Nearctic Neoempheria

1. Sc setose; anteclypeus setose -- 2.
   Sc bare; anteclypeus bare -- 6.
2. M_2 bare; wing infuscated along M_2 ---------- illustris Johan.,1910
   M_2 setose; not infuscated along M_2 ---------------------------- 3.
3. Wing infuscated along M_{1+2}, showing best at fM_{1+2}; R_{4+5} as long or longer than M_{1+2}; apex of wing infuscated; infuscated through Rs and r-m ----------- balioptera (Lw.),1869
   Without the above combination of characters; particularly without infuscation along M_{1+2} and R_{4+5} not as long as M_{1+2} -- 4.
4. R_{4+5} two-thirds as long as M_{1+2}; TIII to TV often entirely light, never less than a median light line -- didyma (Lw.),1869
   R_{4+5} about one-third as long as M_{1+2}; TIII and TV dark above, TIV may be entirely light ---------------------------- 5.
5. Foretibia about twice as long as forecoxa; apical dorsal seta of pedicel subequal to first flagellar segment of antenna; apex of wing infuscated -------- macularis Johan.,1910
   Foretibia subequal in length to forecoxa; apical dorsal seta of pedicel longer than first two flagellar segments of antenna; apex of wing somewhat lighter than remainder of distal infuscated portion --------------- indulgens Johan.,1910
6. Size 2.5mm; Sc_2 basad of or at fR ----------- nepticula (Lw.),1869
   Size 4.5mm; Sc_2 distad of fR -------------- impatiens Johan.,1910

1. *Neoempheria illustris* Johan., 1910.

1910. Johannsen, Maine Agr. Expt. Sta. Bull. No.180:159(key to species); 163, male, female, fig.100(wing); fig.126,127(male terminalia) ------ NEW YORK.

1952. Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:188(key to species).

The degree of variation of the inner style of the male terminalia found in this species is illustrated (figs.62,63,64,65). The forms illustrated for the Leverett, Massachusetts (fig.62) and the Atlanta, Georgia (fig.63) specimens seem to be more nearly typical in the species. There is no evidence of subspeciation. Perhaps the Florida population (fig.64) may be of specific rank. However, only by more extensive collecting in intermediate areas (northern Florida, southern Georgia) and a careful study of those forms can its status be indicated. Iowa specimens resemble either the Leverett or Atlanta types or show a third form intermediate between those two. The Maryland specimens resemble either the Leverett form of the Atlanta form. The Tennessee specimen is like the intermediate form found in Iowa. The Virginia specimen is much like the Atlanta form but the apical crest is closely appressed to the wide basal portion. The Ontario specimen is almost intermediate in form between the Leverett and Atlanta types but the apical crest is broader than the similar intermediate form shown by Iowa specimens. A specimen from Holliston, Massachusetts (fig.65) shows the closest form to the Florida specimen. It also shows the variation of the species in a small geographical range. Holliston is 100 miles from Leverett.

The specimens from Florida are darker than those from other parts of the range of the species. These specimens show a close resemblance to species of the Neotropical area. In particular, one is reminded of the species in the ornatipennis group because of the similarity of the wing pattern.

Florida: Bradenton, March, M.C. Van Duzee, 1 male
West Palm Beach, Morrison Field, Oct.31,1942, D.E. Hardy, 1 female

Georgia: Atlanta, Aug.2,1913, 1 male

Tennessee: 3N, Mixed Mesoph., Gatlinburg, GSMNP, 1500',NW, July 16, 1947, R.H. Whittaker, 1 male

North Carolina: Pisgah Nat'l. For., Allison Crk., Swannawa Gap, May 28, 1946, M. Hanson, 1 female
North Carolina-Tennessee: Great Smoky Mountains, June 9,1939, C.P. Alexander

Virginia: nr. Plummer's Id., Sept.5,1915, W.L. McAtee, 1 male

Maryland: Glen Echo, Aug.6,1922, J.R. Malloch, 1 male
" " " 22 " " 1 female
nr. Plummer's Id., June 6,1916, R.C. Shannon

New Jersey: Princeton, June 21,1921, 1 male
Westville, Aug.23,1921, 2 males

Pennsylvania: Philadelphia, July 14,1891, 1 male
" Aug.2,1891, 1 male

New York: Irving, Aug,26,1917, M.C. Van Duzee, 1?

Rhode Island: Kingston, Aug.30,1910, 1 male

Massachusetts: Leverett, July 6,1952, T. Farr, 1 male
Holliston, N. Banks, 1 male
Auburndale, Aug.13, 1 male

Ontario: Ottawa, July 19,1946, A.R. Brooks, 1 male, 1 female

Iowa: Dolliver Mem. St. Pk., Webster Co., June 30,1950, J. Laffoon, 4 males, 3 females
Ledges St. Pk., Boone Co., June 25, 1950, J. Laffoon, 1 male
" " " " " Oct.18,1949, " 1 female
" " " " " Aug.10,1949, " 1 "
Lacey-Keosauqua, Van Buren Co., Sept.9,1949, J. Laffoon and J. Slater, 1 female
Lacey-Keosauqua, Van Buren Co., Sept.10,1949, J. Laffoon and J. Slater, 1 male
Sioux City, Sept.5,1949, J. Laffoon, 1 female
" " July 15,1950, " 1 male

2. Neoempheria balioptera(Loew),1869.

1869. Empheria balioptera Loew, Berlin. Entom. Zeitschr. 13:136.

1878. Osten-Sacken, Smiths Misc. Coll. 270:9 ----- new name proposed for Empheria.

1909. Mycomyia(Neoempheria) balioptera, Johannsen Genera Insectorum, Fasc.93:46 ----- Neoempheria regarded as subgenus.

1910. Johannsen, Maine Agr. Expt. Sta. Bull. No.180:159(key to N. American species); 164 ----- Neoempheria regarded as a genus.

1948. Neoempheria lutea Tollet, Bull. Mus. roy. Hist. nat. Belg.24:1, 1 male - holotype, figs.1-5(male terminalia); fig.6(wing) ----- MARYLAND. New synonymy.

1952. Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:188(key to species).

I have examined the type(1227) of <u>balioptera</u> at the Museum of Comparative Zoology(Harvard University). The abdomen and most of the legs are missing. There is no doubt, however, as to the identity of the species. The specimen is labelled "Ill."

This species is closely allied to the European <u>lineola</u>. Tollet mentioned this relationship when he described <u>lutea</u> and his figures leave no doubt as to the synonymy of his species with <u>balioptera</u>.

Tennessee: 2B, Cove Forest, Gatlinburg, GSMNP, 3000', June,1947,
R.H. Whittaker, 1 male

New Jersey: Brookside, Morris Co., July, 1 female
Ramsey, June 10,1916

Pennsylvania: Hazleton, June 12,1914, Dietz, 1 male
Philadelphia, July 1, 1917, C. Ilg(/), 1 female
" June 6, 1892

New York: Ithaca, July 2,1901, O.A. Johannsen, 1 male
" June 12,1915 1 "
" " 23 " 1 "
" 1 "
Norton's Landing, Cayuga L., June 21,1872, 1 male
Canajoharie, July 1,1934, H.K. Townes, 1 female
Buffalo, June 15,1909, M.C. Van Duzee, 1 male, 1 female
Lancaster, June 4,1911, M.C. Van Duzee, 1 female
S. Wales, June 29,1912, M.C. Van Duzee, 1 male, 1 female

Quebec: Montreal, July 6,1902, 1 male

Illinois: Homer, June 17,1917, 1 male

Iowa: Sopers Mill Dam, 4 mi. E. Gilbert, May 25,1949, E. Manny, 1 male
Dolliver Mem. St. Pk., Webster Co., June 30,1950, J. Laffoon,
1 male

Ames, June 22,1946, D.E. Hardy, 1 male
" May 9,1948, Meng(?), 1 male
" June 23,1948, R. Jacobson, 1 male
" May 15,1949, J. Laffoon, 1 female

3. Neoempheria didyma(Loew),1869.

1866. Sciophila bimaculata Loew(nec von Roser,1840), Berlin. Entom. Zeitschr. 10:6 ----- ONTARIO. Homonym.

1869. Empheria didyma Loew, loc. cit. 13:136 ----- new name.

1878. Osten-Sacken, Smiths. Misc. Coll. 270:9 ----- new name proposed for Empheria.

1909. Mycomya(Neoempheria) didyma, Johannsen, Genera Insectorum, Fasc. 93:47 ----- Neoempheria regarded as a subgenus.

1910. Johannsen, Maine Agr. Expt. Sta. Bull. No.180:158(key to species); 160 ----- Neoempheria regarded as a genus.

1937. Neoempheria digitalis Fisher, Jour. N.Y. Ent. Soc. 45:390, 1 male; fig.18(male terminalia) ----- MICHIGAN; MAINE; NEW HAMPSHIRE; MASSACHUSETTS; NEW YORK; PENNSYLVANIA; VIRGINIA; WISCONSIN.

1943. Fisher, Ent. News 44:150 ----- the identity of N. digitalis.

1952. Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:188(key to species).

I have examined the type(1266) at the Museum of Comparative Zoology (Harvard University) and find that it is a female in good condition. The locality label on the type appears to be "Engl. R." followed by some writing I cannot decipher. This locality is a town in western Ontario.

An examination of available male terminalia shows the following variation. Eighth sternite of the Virginia specimen with apex somewhat pointed, less so on Maine specimen and nearly truncate on all other specimens. Outer style nearly as wide as long on specimens from New Hampshire, Virginia and British Columbia. Outer style of specimens from Maine and New York almost twice as long as broad, their width being equal to the smallest actual measurement of the other specimens, their length the longest actual measurement.

This is the only species presently known to occur west of Iowa. It does not seem to exhibit any affinities with any other species known to me.

Virginia: Great Fall, Sept.24, 1 male, 1 female

Pennsylvania: North Mt., Sept.1,1897, 1 female

New York: Ithaca, June 15,1916, 1 male

Massachusetts: Amherst, Aug.30,1942, F.R. Shaw, 1 male

New Hampshire: Franconia, July 12,1915, C.H.T. Townsend, 1 male
White Mtns., Morrison, 1 broken specimen

Maine: Ellsworth, Eddy, 1 male

Quebec: O. Golf Club, Aug.2,1925, F.P. Ide, 1 female

British Columbia: Pass Cr., May 23,1947, H.R. Foxlee, 1 male
Robson, Aug.9,1949, H.R. Foxlee, 1 male

4. Neoempheria macularis Johan.,1910.

1910. Johannsen, Maine Agr. Expt. Sta. Bull. No.180:159, male, female, fig.98(wing); fig.130(male terminalia) ----- NEW YORK; QUEBEC.

1952. Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:188.

The male terminalia of this species show almost no variation in the specimens studied.

A male specimen from New Jersey shows an aberration of the terminalia. One side of the tergal portion of the terminalia has an additional dorsal well-developed style, somewhat resembling the tergal style of impatiens.

The terminalia of this species show a basic form similar to that of Neotropical species of this genus.

Tennessee: 2E, Hemlock For., Gatlinburg, GSMNP, 4000', NE, June 29, 1947, R.H. Whittaker, 1 female

New Jersey: Newark, June 14, 1 male

Pennsylvania: Natrona, July 12,1898, 1 female

New York: Hamburg, July 10,1913, M.C. Van Duzee, 1 female
Ithaca, July 16,1903, 1 male

Massachusetts: Amherst, June 18,1934, S.D. Edmund, 1 male

New Hampshire: Tuckerman's Rav. Tr., Mt. Washington, July 31,1944, 3000', J.F. Hanson, 1 male

Maine: Seal Harbor, July 29,1930, A.L. Melander, 1 male
Princeton, July 12,1904, 1 male

Quebec: Trinity Bay, Aug.17,1929, W.J. Brown, 1 female
Wakefield, June 26,1946, G.E. Shewell, 1 female

Iowa: Ames, June 29,1948, D. Torgeson, 1 male

6. Neoempheria indulgens Johan.,1910.

1910. Johannsen, Maine Agr. Expt. Sta. Bull. No.180:162, male, female, fig.99(wing); fig.128(male terminalia) ------ NEW YORK; NORTH CAROLINA; QUEBEC.

1952. Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:188(key to species).

There is some variation in the form of the tergal styles and outer styles of the terminalia. The variations are small such as the degree of convexity of the apex of the styles or the width-length relationship of the styles. The variations occuring in any one geographical area are as great as the variations throughout the series studied.

The terminalia do not seem to indicate close relationships with any other species presently known to me.

Tennessee: 2 B, Cove For., Gatlinburg, GSMNP, 3000', June 24,1947,
R.H. Whittaker, 1 female

Virginia: Dead Run, Fairfax Co., June 22,1915, R.C. Shannon, 1 male
Great Falls, Dec.1941, 1 male, 1 female

West Virginia: Fairmont, June 22,1908, 1 male

Maryland: Plummer's Id., July 11,1915, R.C. Shannon, 1?

New York: Ithaca, July 9,1891, 1 male
" 1 female
" July 8,1902, 1 male
McLean Res., June 24,1924, 1 male
W. Nyack, May 31,1936, A.L. Melander, 1 female

Vermont: St. Albans, June 21,1915, 1 male

Quebec: Knowlton, June 28,1929, J. McDunnough, male and female in copula
" July 13, " L.J. Milne, 1 female
Wakefield, July 9,1946, G.E. Shewell, 1 male
Orillia, July 7,1938, A.L. Melander, 1 female
Montreal, July 29,1900, 1 male

Indiana: Lafayette, July 4,1916, 1 female
" June 4, 1 male

Iowa: Ledges St. Pk., Boone Co., June 25,1950, J. Laffoon, 1 female
" " " " " July 29, " " 2 males, 1 female
" " " " " June 25, " " 1 female
Pike's Peak St. Pk., Clayton Co., July 4,1949, J. Laffoon, 1 female
Wapsipinicon St. Pk., Jones Co., July 5,1949, " 1 "
Ames, May 26,1949, D.A. Byrd, 1 female
Sioux City, June 9,1949, Slater and J. Laffoon, 1 male

6. Neoempheria impatiens Johan.,1910.

1910. Johannsen, Maine Agr. Expt. Sta. Bull. No.180:161, female, fig.96 (wing); fig.131(female terminalia) ----- RHODE ISLAND; NORTH CAROLINA; TENNESSEE.

1952. Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:188(key to species).

The male of this species has never been described nor illustrated, therefore this opportunity is taken to describe it. The male terminalia are figured (figs.66,67). An unpublished designation of the allotype by Fisher is disregarded in favor of a specimen obtained from an area closer to the type locality, Rhode Island.

Male: Head with vertex and occiput yellowish; two ocellar bristles reaching nearly to base of antennae; ocellar prominence dark; postfrons yellowish; prefrons, postclypeus and anteclypeus yellow, bare; antenna with scape and pedicel yellowish, flagellar segments brownish or with a variable number of segments (up to 7) yellowish, first flagellar segment subequal to scape and pedicel, apical dorsal seta of pedicel as long as first two flagellar segments; palpus dark.

Thorax: pleura yellowish, a horizontal suffused stripe across pleurotergite, apex of mesoepimeron and katepisternum; mesonotum yellow or with faint indication of dorsocentral stripes, sublateral stripes sometimes well-developed; scutellum with two large scutellar setae and some shorter setae laterad and dorsad of these; postnotum yellowish to brownish; wing 4 to 4.5 mm., pattern as for female; Sc_2 ending distad of fR; Sc and M_{1+2} bare, M_1, M_2, M_4, Cu and Cu_1 setose.

Abdomen: TI dark dorsally; TII antero-dorsal dark saddle; TIII with antero-lateral portion light; TIV light; TV dark; TVI and TVII dark dorsally.

Terminalia: (figs.66,67); tergal portion with apical process subcylindrical, slightly curved, setose, about one-fourth as long as basal portion; basal portion gently widened with a group of long strong setae laterally at base and covered with smaller finer setae except on the broadly connected median portion; outer style flattened, subovate, setose; inner style ensiform, bare; inner process a short, flattened, apically rounded lobe; paramere with two subovate lobes joined medianly half way from base, a median short sharp process at junction of lobes; SIX truncate, with a lateral process-like fold; subaedeagal rod sagittiform; anal segment short, sternal lobe emarginate.

A specimen from Chester, Massachusetts is designated allotype. The specimen will be deposited in the Museum of Comparative Zoology at Harvard University.

The terminalia of this species show affinities with Neotropical species. However, the wing pattern found in this species is nowhere duplicated nor closely approximated in the Latin American species.

North Carolina: Valley of Black Mtns., July 13,1906, W. Beutenmuller, female-paratype
North Carolina-Tennessee: Great Smoky Mtns., June 17,1939, M.M. Alexander

Virginia: Shenandoah Big Meadows, July 3,1939, A.L. Melander, 1 female
Glencarlyn, July 2, 1 female

Maryland: Glen Echo, Aug.22,1922, J.R. Malloch, 1 male
Silgo, June 27, 1928, J.M. Aldrich, 1 male, 1 female

New Jersey: Merchantville, June 28,1891, 1 male

New York: Milford Center, July 13,1935, H.K. Townes, 1 male, 1 female
Hancock, Aug.3,1935, H.K. Townes, 1(?m)

Massachusetts: Leverett, Sept.12,1952, E.I. Coher, 1 female
Amherst, Aug.30,1942, F.R. Shaw, 1 male, 1 female
" June 28, 1952, T.H. Farr, 1 female
Chester, Aug.9,1912, 1 male
Auburndale, Aug.9, 1 male

Quebec: La Trappe, Aug.10,1947, J. Ouellet, 1 male

7. Neoempheria nepticula(Loew),1869.

1869. Empheria nepticula Loew, Berlin. Entom. Zeitschr.13:137.

1878. Osten-Sacken, Smiths. Misc. Coll.270:9 ----- GEORGIA. New Name proposed for Empheria.

1909. Mycomya(Neoempheria) nepticula, Johannsen, Genera Insectorum, Fasc.93:49 ----- Neoempheria regarded as a subgenus.

1910. Johannsen, Maine Agr. Expt. Sta. Bull. No.180:160 ----- Neoempheria regarded as a genus.

1952. Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:188(key to species).

I have examined the types(1225, male; 1225, female) at the Museum of Comparative Zoology(Harvard University). The male has terminalia very similar to but about half as larg as those of impatiens. This species may retain its identity. However, it may also prove to be a subspecies or southern variant of impatiens. Since material is so scarce, there is no choice for the present but to accept the original specific position assigned to this morphological form.

The male type (MCZ,1225) is designated here as lectotype. The terminalia have been placed in glycerin in a vial on the same pin as the male. The portions of the terminalia which differ from *impatiens* are illustrated (figs.68,69). Note the acutely bent tip of the tergal style (fig.69) and the broad ribbon-like form of the inner style (fig.68).

Georgia: types

North Carolina: Raleigh, June 8, 1905, 1 broken specimen

THE GENUS MYCOMYIA RONDANI, 1856.

1856. *Mycomya* Rondani, Dipt. Ital. Prodromus 1:194 -- type species *Sciophila marginata* Mg., 1818, monotypic.

1818. *Sciophila* Meigen, Syst. Beschr. 1:245 - in part, *Mycomyia*.

1863. *Sciophila*, Winnertz, Verh. Zool.-Bot. Ges. Wien 13:707.

1909. *Mycomya*, Johannsen, Genera Insectorum 93:45 -- first recognition of Rondani's concept of the genus.

1910. *Mycomya*, Johannsen, Maine Agric. Exp. Sta. Bull. 180:165 -- first revision of Neartic species, *sensu strictu*.

1913. *Mycomyia*, Edwards, Trans. Ent. Soc. London 1913:335 -- emendation of spelling.

Ocellar prominence not usually well-developed; ocellar bristles seldom reaching far beyond ocelli; eyes slightly emarginate above antennae, elongate ovate; postclypeus bare; anteclypeus setiferous or bare; mouthparts short (except one undescribed species from California).

Scutellum with two or four large setae; males of some groups with mesocoxal spurs; tibial combs generally 1-2-2; wing with costa not produced beyond R_5; R_5 reaching tip of wing; subcosta branched or not; wings hyaline (except one undescribed species from Brasil); no fold present in cell R_5.

Terminalia of various forms which are characteristic for each group of related species.

NEOTROPICAL *MYCOMYIA*

The genus *Mycomyia* is highly developed in the Neotropical Region, the Chilean and the Brazilian subregions having the richest known fauna. The fungus gnat fauna of the islands of the region, including the entire Antillean subregion, is practically unknown.

When the first species of Neotropical fungus gnats were described, the close relationship of many species of *Mycomyia* was not appreciated. In addition, many of those species were referred to *Sciophila*. It is very difficult to determine whether those species are true *Sciophila* Mg.,1818 or *Sciophila* Winn.,1863, which is a synonym of *Mycomyia*. Probably some of these early *Sciophila* would now be considered to belong to other genera than those already mentioned. The types are not available for many of the species.

All Neotropical species of *Sciophila* which were described prior to 1909 and do not have suffused wings are listed below. Species of *Sciophila* in which the type exists and has been found to belong in a genus other than *Mycomyia* are omitted. The second column indicates the position ascribed to some of the *Sciophila* by later authors.

Blanchard,1852: Chile

Sciophila chilensis	Mycomyia chilensis(Freeman,1951)
" obsoleta	?

Philippi,1865: Chile

Cnephaeophila fenestralis	Mycomyia fenestralis(Johannsen,1909)

Sciophila valdiviana	Mycomyia valdiviana(Freeman,1951)
" thoracica	?
" praecox	?
" vernalis	?
" aberrans	?
" australis	?
" pusilla	?
" ocreata	?

Schiner,1868: Brazil

Sciophila americana	Mycomyia americana(Johannsen,1909)

Bigot,1888: Chile

Sciophila tristis	?
" capopus	Tetragoneura calopus(Lynch-Arribalzaga,1892)

Lynch-Arribalzaga,1892: Argentina

Sciophila clavata	Mycomyia clavata(Johannsen,1909)
" infirma	" infirma(" ")

Williston,1896: St. Vincent, W.I.

Sciophila diluta(homonym)	Mycomyia meridionalis(Johannsen,1910)

Enderlein (1911) was the first worker to describe Neotropical species of Mycomyia using Rondani's name rather than Winnertz's Sciophila. The 1911 paper contains the descriptions of two species and a "variety" of one of them. The species described were from Santa Catarina, Brazil, and types were deposited in the Stettin Zoological Museum which was destroyed in World War II. The types are presumed to have been lost at that time. Edwards (1931) described a Peruvian species from two females. I have seen the paratype specimen but cannot place the species. Fisher (1939) recorded *Mycomyia tantilla* from Costa Rica. Shaw (1940) described the first new species, *M. citrina*, from Central America, a Costa Rican form.

In the last few years, the group has been more intensively studied. Coher (1950,1952) described twenty-four species, in three groups, from Brazil and Argentina. Freeman (1951) included twenty-seven species in his study of Chilean and Patagonian *Mycomyia*.

It may be seen from the foregoing review that nearly all the known Neotropical species of *Mycomyia* or known species that could possibly pertain to that genus have been described from southern South America, particularly Chile, Patagonia, No. Argentina and So. Brazil.

The spurred species of Neotropical *Mycomyia* are not treated fully in the following account of species. It is apparent to the writer, however, that the spurred group is developed equally as well as the unspurred group. The number of groups of species as well as number of species is about equal for the spurred and unspurred forms.

Mycomyia tantalos n.sp.

Male: Head with clypeus yellow to brownish, anteclypeus with scattered setae like those on palpi, apical ones longest; antenna with first flagellar segment slightly longer than scape plus pedicel; apical dorsal seta of pedicel barely longer than first flagellar segment.

Thorax: pleura yellow; apex of katepisternite infuscated; mesonotal pattern well-developed except anteriorly; scutellum with scattered short, fine setae; postnotum with median ventral infuscation; foretibia barely longer than forebasitarsus; branches of M_{1+2} distinctly shorter than petiole; M_{1+2} is longer than Cu_1 which is longer than M_2.

Abdomen: TV-TVII dark red-brown. Eighth tergite a narrow arcuate band with posterior margin setiferous except along median portion; eighth sternite subtriangular, apically truncate, without setae.

Terminalia: (figs.70,71); outer style with apex bent mesally, truncate; distal median process flattened long and narrow with two or three apical setae; lower median process flattened subtriangular, setuliferous; aedeagus long and narrow; tergal portion without comb-like spurs and spines; a median arcuate process; anal ring with lateral process flattened, expanded apically, median portion truncate, subtriangular; anal segment short and broad.

Holotype: BRAZIL:- State of Sao Paulo: Cantareira, Oct.3,1945 (M. Barretto).

Paratopotypes: 1 male, Nov.1945 (J. Lane); 1 male, April 1946 (M. Barretto); 1 male, Aug.8,1946 (M. Barretto).

Observations: This is the first species of the _tantilla_ group (Group C of Coher,1952) to be described which does not have the comb-like structure on the tergal portion of the terminalia. If it may be said to be closely related to any particular species so far described, _midas_ would come closest to filling that position.

obliqua group

I have not seen the European species *circumdata* which belongs to this group. The pattern of the abdominal tergites in which the posterior margin of TII to TV is dark, TI dark at least dorsally and TVI and TVII dark, the absence of a mesocoxal spur and the form of the male terminalia serve to distinguish the group. The tergal portion of the male terminalia has a pair of strong mesally-crossed spurs and short tergal styles. The sternal portion bears a paid of long ventral filaments, a lateral setiferous lobe and a bifid apical lobe, one part of which is simple, the other with two apical tooth-like spurs.

Mycomyia austrobliqua n.sp.

Male: Head with vertex and occiput and postfrons fuscous; ocellar setae reaching slightly beyond ocelli; prefrons and clypeus yellowish-brown, postclypeus with scattered setae and anteclypeus with a group of apical setae like those on palpi; antenna with scape, pedicel and base of first flagellar segment yellowish, flagellum brownish; first antennal segment slightly longer than scape plus pedicel, apical dorsal seta of pedicel subequal to first flagellar segment; palpi yellow-brown.

Thorax: pleura yellowish; pleurotergite, base of anepisternite and apex of katepisternite suffused; mesonotum dark, light laterally and at humeri; scutellum as dark as mesonotum, bare except for 4 scutellar setae; postnotum suffused uniformly or with dorso-lateral and median ventral dark spots; legs yellow; foretibia barely longer than fore-basitarsus; no comb mesally on mid and hind leg, comb between spurs on midleg well-developed or not; wing with Sc_2 ending near middle of R_{1+2+3}; apically setose; M_1, M_2, M_4, Cu and Cu_1 setose; M_{1+2} bare; M_{1+2} slightly longer than Cu_1 which is subequal to M_2; fM_{1+2} distad of fRs; posterior fork below fR.

Abdomen: TI dark; TII to TV or TVI with antero-lateral angle light, succeedingly smaller on each segment; TVI and TVII dark. TVIII ribbon-like with two lateral setiferous lobes. SVIII subtriangular, truncate apically.

Terminalia: (figs.72,73); outer style bifid, dorsal portion expanded, setiferous, ventral portion digitiform, setiferous; apical process bilobed, one portion with apical bifid spine, subterminal portion subovoid, setiferous; paramere broad, subtriangular, meeting aedeagus along midline; aedeagus long, apically with a flattened, narrow hook; subaedeagal rod broadly V-shaped; basal ventral wall of sternal wall bearing an apically pointed ribbon-like process. Tergal portion with two tergal spurs, broad at base, crossed medianly; tergal style a short lobe with a subapical seta one-half as long as tergal spur and with a number of short peg-like setae and a few finer ones; anal segment short.

Holotype: BRAZIL:- State of Sao Paulo: Campos do Jordao, Dec.1945 (J. Lane).

Paratopotypes: 3 males with same data as holotype.

Paratypes: BRAZIL:- State of Sao Paulo: 1 male, Cid. Jardim, Jan.1946 (M. Barretto); 1 male, F. Vasconcelos, Aug.1946 (J. Lane); 2 males, Cantareira, Aug.8,1946, Nov.3,1948 (M. Barretto).

Observations: This species is very closely allied to the Nearctic obliqua and is separable only on the basis of the form of the terminalia in which the ventral lobe of the outer style is much narrower than the dorsal lobe while in obliqua the ventral lobe is almost as broad as the dorsal lobe. The apex of the tergal style of austrobliqua bears short peg-like apical setae while obliqua bears fine setae apically. The apex of the aedeagus of austroblique is narrow in lateral profile, the apical hook is well-formed, the apex of the aedeagus of obliqua is broad in lateral profile, the apical hook large and rounded. Other differences are found but these will serve to distinguish the species most easily.

furcata group

I have not seen the New Zealand species *furcata* Edws., therefore it is not known whether all characters that might serve to distinguish the group are presented here. In *furcata* and *pontis* n.sp., the abdomen is dark, mesocoxa without a spur and the terminalia similar. The tergal portion of the terminalia with two strong mesally crossed spurs, tergal styles large, apically swollen and setiferous; a median pair of combs and with a dorsal lobe bearing several setae. Sternal portion with outer style bifid.

<u>Mycomyia</u> <u>pontis</u> n.sp.

Male: Head with vertex and occiput and postfrons fuscous; ocellar setae reaching slightly beyond ocelli; prefrons and clypeus yellow, postclypeus with scattered setae and anteclypeus with a group of apical setae like those on palpi; antenna with scape and pedicel yellowish to brown, flagellum brownish; first antennal segment slightly longer than scape plus pedicel, apical dorsal seta of pedicel subequal to first flagellar segment; palpi yellowish to fuscous.

Thorax: pleura yellow; mesonotum variable, pattern slightly developed or fuscous medianly with sides and humeri lighter; scutellum suffused, bare except for 4 scutellar setae; postnotum suffused; legs yellow; foretibia and forebasitarsus subequal in length; no comb on mid and hind tibiae; wing with Sc ending distally on R_{1+2+3}; Sc, M_1, M_2, M_4, Cu and Cu_1 bare; M_{1+2} slightly longer than Cu_1 which is subequal to M_2; fM_{1+2} distad of fRs; posterior fork below fR or below cell R_3.

Abdomen: reddish-brown or TII and TIII light antro-laterally; TVIII narrow, bracket-shaped, posterior margin setose; SVIII broadly subtriangular, apex truncate.

Terminalia: (figs.74,75); outer style bifid, inner portion subcylindrical with several strong setae subapically and other finer setae apically; outer portion shorter, pear-shaped with a small subapical lobe, apically setose; aedeagus peculiarly shaped, apices strongly bent ventrally and strongly sclerotised medianly; tergal portion with tergal style long and flattened, tapering apically, strongly setiferous along distal margin; distal margin with long setae, this portion recurved ventrally, flattened, with short strong apical comb of setae; a dorsal accessory lobe with long setae; two tergal spurs long, apically recurved dorsally, crossed medianly; anal segment moderately developed.

Holotype: BRAZIL:- State of Sao Paulo: Cajuru, Feb.1947 (M. Barretto).

Paratopotypes: 2 males with same data as holotype.

Paratypes: BRAZIL:- State of Sao Paulo: 4 males, Jaragua, Nov.1951 (J. Lane).

Observations: This species is quite unusual as far as the form of the terminalia are concerned and, to my knowledge, has no close relative in the Neotropical region. There is, however, a species from New Zealand, M. furcata Edwards,1926, which seems to be closely related. I have not seen specimens of that species, but there is little doubt from the drawing given by Edwards that pontis belongs to the same group. The main difference in the two species appears to be in the form of the ninth sternite, pontis having no median sternal styles.

citrina group

For the present, this group is characterized as follows: meso-thoracic spurs absent; Sc branched, antero-lateral angle of abdominal tergites light; tergal portion of terminalia with broad tergal style, a membranous process ventrad of this and a sclerotized process with two setae ventrad of these; two small median processes.

This group appears to have characters of both the *tantilla* group of species and the *opacra* group of species. It is, however, more closely related to the latter group.

Mycomyia citrina Shaw, 1940

1940. Shaw, Rev. Ent. 11:806, 1 male; fig. 4(male terminalia ----- COSTA RICA.

I have seen the terminalia of the type. The terminalia are re-drawn (figs. 76, 77). Some of the details of the tergal portion are reconstructed from the original drawing, since the type has been re-mounted and some of the setae were broken or have been lost.

There are no further records of the species. It is most closely related to excerta n.sp. from which it may be distinguished by the form of the terminalia, particularly the tergal processes. There is also no similarity of sternal portions of the terminalia between the two species.

<u>*spacra*</u> group

Head: vertex and occiput fuscous; ocellar bristles not reaching beyond ocelli; clypeus with scattered setae; first flagellar segment of antenna at least slightly longer than scape plus pedicel; apical dorsal seta of pedicel shorter than first flagellar segment; palpus fuscous.

Thorax: pleura yellowish; pleurotergite suffused; coxae yellowish, anterior surface of forecoxa with scattered setae, antero-apical part of mesocoxa with scattered setae and an irregular lateral row of setae on apical half, hind coxa with a lateral irregular row of long setae; femora yellowish; foretibia and forebasitarsus subequal; mesocoxal spur absent; comb between spurs of midtibia absent or poorly developed; Sc unbranched, Sc_2 ending in R_{1+2+3}.

Abdomen: TI dark dorsally; TII to TIV with light antero-lateral portion; TV to TVII dark; TVIII bracket-shaped.

Terminalia: tergal portion with broad tergal style bearing short, strong apical or subapical(<u>multiseta</u>) setae; two to three processes arising from near base of tergal style, the outermost largest, setiferous, the others usually narrow, flattened, ribbon-like bands.

Mycomyia epacra n.sp.

Male: Head with postfrons fuscous; prefrons and clypeus fuscous, scattered setae of clypeus like those on vertex; antenna with scape and pedicel yellow-brown or fuscous, flagellum fuscous; apical dorsal seta of pedicel one-half as long as first flagellar segment.

Thorax: upper portion of anepisternite and mesoepimeron occasionally suffused; mesonotum with pattern variable, acrostichal and dorsocentral stripes fused or not present, sublateral stripe present, humeri light; scutellum dark, bare except for 4 scutellar setae; postnotum color of pleurotergite; median comb of mid and hind leg well or poorly developed; wing with Sc_2 ending at middle or beyond on R_{1+2+3}, setose; M_1, M_2, M_4, Cu and Cu_1 setose, M_{1+2} bare; M_{1+2} subequal to Cu_1 which is shorter than M_2; fM_{1+2} distad of cell R_3; posterior fork below cell R_3.

Abdomen: TI dark dorsally; TII to TIV with successively smaller light antero-lateral corners; TVIII with posterior margin setose; SVIII subtriangular, apex truncate, rounded, bare.

Terminalia: (figs.78,79); outer style long, bifid from base, outer portion angulate subapically, flattened beyond angle and slightly spatulate, bare; inner portion extending slightly beyond outer portion, flattened apically with an apical lateral point and a single long fine apical seta; inner style with a broad base hinged to margin of sternal lobe, apical portion flattened, at an angle to basal portion, expanded apically with two strong setae, finer setae along apical margin; sternal lobe with a bare lateral apical flattened process, also a median setiferous lobe; aedeagus appearing somewhat arrow-shaped, reaching slightly beyond apex of median lobe of sternal lobe; tergal portion with a subtriangular tergal style bearing an apical row of three to six short strong setae; two processes arise at base of tergal style, outer flattened, very broad, setiferous, apical seta reaching beyond apex of tergal style; inner as ong as tergal style, flattened, apex spatulate, bare; a large lobe at lateral distal corner of base; anal segment short.

Holotype: BRAZIL:- State of Sao Paulo: Boracea, Aug.14,1947 (Lane).

Paratopotype: 1 male with same data (Rabello, Travassos F. and Lane).

Paratype: BRAZIL:- State of Sao Paulo: 1 male, Campos do Jordao, Dec.1945 (Lane).

Observations: This species is most closely related to theobaldi from which it may be distinguished by the setation of the veins and the details of the terminalia, particularly the fork of the tergal style.

Mycomyia subepacra n.sp.

Male: Head with postfrons fuscous; scattered setae of clypeus like those on ventral surface of scape; antenna with scape and pedicel yellow-brown, flagellum fuscous; apical dorsal seta of pedicel about one-third as long as first flagellar segment.

Thorax: anepisternite suffused; mesonotum with acrostichal and dorsocentral stripes fused, sublateral stripe broad not definite, humeri light; scutellum dark, bare except for 4 scutellar setae (one specimen with five); postnotum slightly darker than pleurotergite; comb 1-2-2; wing with Sc_2 ending at or slightly beyond middle of R_{1+2+3}, apical third or half setose; M_1, M_2, M_4, Cu and Cu_1 setose, M_{1+2} bare; one wing of one specimen shows a x-vein from fM to R_5; M_{1+2} is shorter than or subequal to Cu_1 which is shorter than M_2; fM_{1+2} distad of cell R_5; posterior fork slightly before or below Rs.

Abdomen: TI slightly darker along median dorsal line; TII-TIII anterolateral corner light; TIV-TVII dark; TVIII with lateral portion widened, posterior margin setose; SVIII subtrapezoidal, anterior margin deeply emarginate, bare.

Terminalia: (figs.80,81); outer style long, bifid form base, outer portion curved flattened apically and slightly spatulate, bare; inner portion extending slightly beyond outer portion, with an apical and lateral apical point and two long strong apical setae; inner style with a broad base hinged to margin of sternal lobe; apical portion flattened, at an angle to basal portion with two strong apical setae and a row of fine marginal setae; sternal lobe with a bare lateral apical flattened process, also a median setiferous lobe; aedeagus appearing somewhat arrow-shaped, reaching slightly beyond apex of median lobe of sternal lobe; tergal portion with a subtriangular tergal style bearing distal group of two or three short strong setae, apical angle with two or three short setae; two processes arise at base of tergal style, outer flattened and clubbed distally, setiferous with an apical seta reaching beyond apex of tergal style, inner as long as tergal style, flattened apically, bare; a large lobe at lateral distal corner of base; anal segment short.

Holotype: BRAZIL:- State of Sao Paulo: Boracea, Aug.14,1947 (Rabello, Travassos and Lane).

Paratopotype: 1 male, Aug.1947 (Lane).

Observations: This species is very closely related to opacra from which it is certainly separated by the form of the terminalia. The outstanding difference is in the shape of the tergal style.

Mycomyia excerta n.sp.

Male: Head fuscous; scattered setae of clypeus like those ventrally on scape and pedicel; antenna fuscous.

Thorax: anepisternite suffused; mesonotum with dorsocentral and sublateral stripes developed, a narrow light line along acrostichal area, humeri light; scutellum dark, bare except for 4 scutellar setae; postnotum color of pleurotergite; wing with Sc_2 ending beyond middle of R_{1+2+3}, setose apically; M_1, M_2, M_4, Cu_1 and Cu setose, M_{1+2} bare; M_{1+2} shorter than its branches, M_{1+2} longer than Cu_1 which is shorter than M_2; fM_{1+2} distad of cell R_3; posterior fork below cell R_3.

Abdomen: TI dark dorsally; TII to TIII or TV with antero-lateral corner light; TVI and TVII dark; TVIII with lateral portion widened, posterior margin setose; SVIII subtriangular, bare.

Terminalia: (figs.82,83); outer style long, subcylindrical, apically setose, setae hair-like; inner style with a broad base hinged to margin of sternal lobe, apical portion flattened, at an angle to basal portion, expanded apically with two strong setae, finer setae along apical margin; sternal lobe with apical margin drawn out into a long point articulating with base of inner style; a small setose lobe on median margin of sternal lobe; dorsal face of sternal portion with a small finger-like lobe bearing a long apical seta; aedeagus appearing somewhat arrow-shaped and reaching to narrow portion of inner style; subaedeagal rod V-shaped; tergal portion with a subtriangular tergal style with two short strong peg-like apical setae and one longer sub-apical strong seta, setiferous; two processes arise at base of tergal style, outer process somewhat flattened, clubbed distally, setiferous, apical seta reaching beyond apex of tergal style, inner slightly longer than tergal style, subcylindrical, apex flattened, spatulate; a large lobe at lateral distal corner of base; anal segment short.

Holotype: BRAZIL:- State of Sao Paulo; Aug.14,1947 (Rabello, Travassos and Lane).

Paratopotype: 1 male with same data.

Observations: This species is most closely related to <u>opacra</u> from which it is easily distinguished by the form of the terminalia, particularly the elongate outer style.

<u>Mycomyia</u> <u>boracensis</u> n.sp.

Male: Head with postfrons fuscous; ocellar bristles reaching beyond ocelli; prefrons and clypeus light red-brown to fuscous, clypeus with scattered setae like those ventrally on scape; antenna with scape and pedicel light, flagellum fuscous; apical dorsal seta of pedicel slightly shorter than first flagellar segment.

Thorax: anepisternite suffused; mesonotum with pattern highly variable, generally some indication of dorso-central stripes which may be fused with acrostichal stripe when present, sublateral stripes present or not, very variable in development, humeri yellowish; scutellum with two large scutellar setae and four to six smaller ones, coloration variable; postnotum variable in color; comb absent between spurs of midleg; wing with Sc_2 ending at or beyond middle of R_{1+2+3}, bare; M_{1+2}, M_1, M_2, M_4, Cu_1 bare, Cu setose apically; M_{1+2} subequal to Cu_1, two-thirds as long as M_2; fM_{1+2} below or distad of cell R_3; posterior fork.

Abdomen: variable light markings on lateral portion of tergites I-IV, always dark above; TVIII narrow, posterior margin setose; SVIII subtriangular, without setae.

Terminalia: (figs.84,85); outer style subcylindrical, with several long subapical setae; inner style recurved, flattened, apex somewhat expanded, a small apical spatuloid process and two shorter heavier subapical setae; inner sternal process flattened, narrowing apically into a slightly hooked process; sternal lobe broad and rounded with large apical setae; tergal portion with a broad style bearing an apical row of subspatulate setae; three processes arise at base of tergal style, outer stout, subcylindrical bearing large setae; middle slender, as long as tergal style, sharply bent before apex; inner reaching nearly to flection of middle process and narrower; anal segment short.

Holotype: BRAZIL:- State of Sao Paulo: Boracea, July 1949 (Lane and Coher).

Paratopotypes: 5 males with same data as holotype; 4 males Aug.14,1947 (Lane); 3 males, Sept.1947 (Lane); 2 males, Nov.1947 (Lane).

Paratypes: BRAZIL:- State of Sao Paulo: 4 males, Campos do Jordao, Aug.1949 (Lane; 1 male, Dec.1945; 1 male, Cajuru, Feb.1947 (Barretto); State of Rio de Janeiro: 1 male, Itatiaia, Aug.1946 (Barretto).

Observations: This species is most closely related to the following six(6) new species, particularly epacra n.sp. from which it can be told by the form of the sternal portion of the terminalia. There is some variation in the form of the male terminalia, however, it does not seem to be correlated with geographic distribution. That is, the variation within a small range is as great as that for the entire population.

Mycomyia theobaldi n.sp.

Male: Head with postfrons fuscous; prefrons and clypeus yellowish or fuscous, postclypeus with scattered setae shorter than those on anteclypeus; anteclypeal setae like those on palpi; antenna with scape and pedicel yellowish, flagellum fuscous; apical dorsal seta of pedicel slightly shorter than first flagellar segment.

Thorax: anepisternite and mesoepimeron suffused; mesonotum variable with either no pattern and posterior portion suffused or with faint indication of fused acrostichal and dorsocentral stripes, sublateral stripe also faintly indicated, humeri light; scutellum dark, bare except for four scutellar setae; postnotum color of pleurotergite; median comb of fore and hind tibia poortly developed; wing with Sc_2 ending midway on R_{1+2+3}, bare; M_{1+2}, M_1, M_2, M_4, Cu and Cu_1 bare; M_{1+2} longer than Cu_1 which is shorter than M_2; fM_{1+2} distad of cell R_3; posterior fork below cell R_3.

Abdomen: TI dark dorsally, TII-TV variably lighter at antero-lateral corner, TVI and TVII dark red-brown; TVIII narrow, broader at lateral angle, posterior margin setose; SVIII subrectangular, posterior margin emarginate, bare, except for a few scattered setae.

Terminalia: (figs.86,87); outer style long, subcylindrical, slightly swollen subapically, pointed terminally, with several long fine apical and subapical setae; a ventrally projecting process from base of dististyle connected to laterally projecting portion of sternal lobe; inner style flattened, apex expanded with two or three strong setae, reaching to level of tip of aedeagus which is somewhat arrow-shaped; inner sternal process a short lobe at base of aedeagus; sternal lobe large, expanded posteriorly; tergal portion with a broad short tergal style with four or five stout apical setae; three processes arise at base of tergal style, outer stout, somewhat flattened, setiferous; middle as long as tergal style, flattened, with apical spur; inner very fine, about two-thirds as long as middle process; anal segment short.

Holotype: BRAZIL:- State of Sao Paulo, Boracea, July 1949 (Lane and Coher).

Paratopotypes: 2 males, Aug.14,1947 (Lane).

Observations: This species is most closely related to simpla n.sp. but is easily distinguished from that species by the form of the terminalia, particularly the expanded sternal lobe.

Mycomyia simpla n.sp.

Male: Head fuscous; ocellar bristles barely reaching beyond ocelli; clypeus with scattered setae like those on palpus; antenna with scape and pedicel yellow-brown, flagellum missing; apical dorsal seta of pedicel subequal to scape plus pedicel.

Thorax: anepisternite suffused; mesonotum with a crostichal, dorsocentral and sublateral stripes fused, humeri light; scutellum dark, bare except for scutellar setae; postnotum color of pleurotergite; femora somewhat suffused; comb between spurs of midleg not developed; wing with Sc_2 ending at middle of R_{1+2+3}, a pical third setose; M_1, M_2, M_4, Cu and Cu_1 setose, M_{1+2} bare; M_{1+2} shorter than branches, M_{1+2}

longer than Cu_1 which is shorter than M_2; fM_{1+2} distad of cell R_3; posterior fork below cell R_3.

Abdomen: TI slightly suffused along median line; TII-TIII light antero-lateral corner; TIV narrow light anterior margin; TVIII with lateral portion widened, posterior margin setose; SVIII subquadrate, anterior margin emarginate, bare.

Terminalia: (figs.88,89); outer style short, flattened, reaching to apex of inner style and with a small stout nearly apical seta; inner style with a narrow base, flattened and broadened apically with two large apical setae and a row of small setae along apical margin, a definite emarginate area below large setae; sternal lobe with median apical margin prolonged into a long flattened bare process; a small setose lobe on median margin of sternal lobe; aedeagus appearing somewhat arrow-shaped, not quite reaching apex of inner style; sub-aedeagal rod broadly V-shaped; tergal portion with a broadly subtri-angular tergal style bearing two short strong peg-like setae on the lateral apical margin, three setae median to these each successively longer and more narrow, setiferous; two processes arise at base of tergal style, outer process subovoid with two long setae reaching beyond apex of tergal style, setiferous, inner reaching to apex of tergal style strongly spatulate apically; a large lobe at lateral distal corner of base; anal segment short.

Holotype: BRAZIL:- State of Sao Paulo, Boracea, Sept.1947 (Lane).

Observations: This species is closely related to theobaldi from which it may be distinguished by the form of the terminalia, particularly the structure of the elongated style of the sternal lobe.

Mycomyia multiseta n.sp.

Male: Head with ocellar bristles reaching attenuated portion of postfrons; frons and clypeus fuscous, scattered setae of clypeus like those ventrally on pedicel; antenna with scape and pedicel yellow-brown or fuscous, flagellum fuscous; apical dorsal seta of pedicel subequal in length or slightly shorter than first flagellar segment.

Thorax: anepisternite and upper portion of mesoepimeron suffused sometimes; mesonotum with pattern highly variable, humeri light; scutellum dark with from two to eight small setae and two scutellar setae; postnotum color of pleurotergite; foretibia slightly longer than forebasitarsus; comb between spurs of midleg absent; wing with Sc_2 ending at middle of R_{1+2+3}, setose apically; M_1, M_2, M_4 and Cu_1 bare, Cu bare or with scattered setae; M_{1+2} longer than Cu_1 which is shorter than M_2; fM_{1+2} distad of cell R_3; posterior fork below cell R_3.

Abdomen: red-brown, TI-TIV may be light laterally, light portion variable in extent; TVIII subarcuate, narrow, lateral portion widened, posterior margin setose; SVIII subtriangular, bare.

Terminalia: (figs.90,91); outer style short, subcylindrical, curved with one long, strong, apical and a somewhat smaller seta, two or three long, fine setae basad of apical setae; inner style flattened, angulated near base, somewhat pointed apically with an apical broad short seta; inner process variably S-shaped; sternal lobe large, flattened, setiferous, appearing in series to have many shapes which are due to position of median bare pointed portion which is folded in various positions; two processes behind sternal lobe, one a flattened subtrapezoidal piece, second peg-like; aedeagal rod subrectangular with an emarginate anterior margin; tergal portion with a long narrow tergal style with a median patch of strong peg-like setae; two processes arise at base of tergal style, outer subcylindrical and enlarged subapically with one long fine terminal seta and several shorter fine subapical setae; inner reaching nearly to patch of setae on tergal style, flattened apically; anal segment long, reaching nearly to apex of tergal process.

Holotype: BRAZIL:- State of Sao Paulo: Boracea, July 1949 (Lane and Coher).

Paratopotypes: 2 males with same data as holotype; 4 males, Aug.14, 1947 (Rabello, Travassos and Lane); 2 males, Sept.1947 (Lane; 1 male, Nov.1947 (Lane).

Paratypes: BRAZIL:- State of Sao Paulo; 2 males, Campos do Jordao, Dec.1945 (Lane); 1 male, Aug.1949 (Lane).

Observations: This species is most closely related to _opacra_ from which it may be distinguished by the terminalia, particularly the apically setose tergal style and the sternal portion.

dumeta group

The terminalia of dumeta and the absence of the mesocoxal spurs serve to distinguish this species from the species of all other groups of Mycomyia. If it were not for the terminalia and the branched subcosta, this species would closely fit the characters proposed for the spacra group. The terminalia resembles the pattern found in the species with mesocoxal spurs.

Head: ocellar bristles barely reaching beyond ocelli; clypeus with scattered setae; first flagellar segment of antenna longer than scape and pedicel; apical dorsal seta of pedicel shorter than first flagellar segment.

Thorax: pleura yellowish; pleurotergite suffused; coxae yellowish, anterior surface of forecoxa with scattered setae, antero-apical part of mesocoxa with scattered setae and an irregular lateral row of setae on apical half, hind coxa with a lateral irregular row of long setae; femora yellowish; foretibia three-fourths as long as forebasitarsus; mesocoxal spur absent; comb between spurs of midtibia poorly developed; Sc branched.

Abdomen: TI dark dorsally; TII to TV with light anter-lateral portion; TVI and TVII dark.

Terminalia: with four pairs of styles and a median dorsal plate; anal segment well-developed, the lateral lobes finger-like.

Mycomyia dumeta n.sp.

Male: Head with vertex and occiput yellow-brown, ocellar setae barely reaching beyond ocelli; postfrons lighter than vertex; prefrons and clypeus yellowish, clypeus with scattered setae, those on anteclypeus longer than those ventrally on scape; antenna with scape, pedicel and most of first flagellar segment yellowish, flagellum fuscous; first antennal segment longer than scape and pedicel, apical dorsal seta of pedicel about one-half as long as first flagellar segment; palpus yellowish.

Thorax: pleura yellow; pleurotergite and lower margin of katepisternite suffused; mesonotum with dorsocentral and sublateral stripes developed, a narrow light acrostichal stripe, humeri light; scutellum yellow-brown with scattered small setae and four large scutellar setae; postnotum suffused centrally; legs yellow; foretibia three-fourths as long as forebasitarsus; comb between spurs of midleg poorly developed; wing with Sc forked, Sc_2 ending in R_{1+2+3} at apex of cell R_3, apical half of Sc setose; M_1, M_2, M_4, Cu and Cu_1 setose, M_{1+2} bare; M_{1+2} shorter than Cu_1 which is equal to M_4; fM_{1+2} distad of cell R_3; posterior fork barely basad of cell R_3.

Abdomen: TI dark dorsal saddle; TII - TV antero-lateral area light, successively smaller; TVI and TVII dark; TVIII and SVIII have been lost.

Terminalia: (figs.92,93,94); outer style subtriangular, apex slightly bent medianly, setose; inner style hinged to sternal lobe, somewhat flattened with base transverse, apical portion strongly bent, longitudinal with several closely approximated apical strong setae; sternal lobe apically rounded; aedeagus hooked apically with oval subapical lobe; subaedeagal rod U-shaped with apical nipple; tergal portion complicated, outer style forcep-like, bare; process mesad of this peculiar, flattened, pointed apically with tufts of fine setae along margins; inner process bifid, outer portion subcylindrical with fine apical setae, inner portion heavy, subcylindrical, apical portion darkened with two blunt apical spurs; dorsal process joined medianly, lateral portion sclerotised with fine apical setae; anal segment short with lateral lobes subcylindrical, bent mesally.

Holotype: BRAZIL:- State of Sao Paulo; Cantareira, Aug.8,1946 (M. Barretto).

Observations: This species is not closely related to any species known to me and so far is unique in the form of the terminalia.

coxalis group

Mycomyia connecta n.sp.

Male: Head with vertex, occiput and postfrons fuscous; ocellar bristles reaching to attenuated portion of postfrons; prefrons and clypeus yellow-brown, clypeus with scattered setae shorter than those on palpus; antenna with scape and pedicel yellowish, first antennal segment lighter than remainder of fuscous flagellum and longer than scape and pedicel, apical dorsal seta fine, about one-fourth as long as first flagellar segment; palpus fuscous.

Thorax: pleura deeply suffused except for yellowish anterior pronotum and proepisternum and lighter suffusing of upper katepisternite and metaepisternite; mesonotum with narrow light acrostichal stripe between two dark stripes, sublateral stripes broad, humeri and lateral margin light; scutellum fuscous with a few small scattered setae and four large scutellar setae; postnotum fuscous; forecoxa yellow, mid and hind coxae fuscous, femora yellow; foretibia one-third longer than forebasitarsus; combs 1-0-2; wing with Sc unbranched, Sc_2 ending in basal part of R_{1+2+3}, apically setose; M_1, M_2, M_4, Cu and Cu_1 setose, M_{1+2} bare; M_{1+2} longer than Cu_1 which is equal to M_2; fM_{1+2} distad of cell R_5; posterior fork below cell R_5.

Abdomen: TI light postero-lateral corner; TII-TV light posterior band; TVI and TVII dark; TVIII bracket-shaped, lateral portion widened, posterior margin setose except in median area; SVIII subtrapezoidal, bare.

Terminalia: (figs.95,96); outer style bifid, ventral portion with expanded base, apical part somewhat flattened, rounded apically with two large setae closely appressed to lateral face and scattered long, fine setae; dorsal portion flattened, large with a lobe midway on dorsal margin, rounded apically, setose; inner style subcylindrical, curved apically, bare; inner process subtriangular, hooked apically, bare; sternal lobe setiferous apically with a large seta borne on a large basal process; aedeagus elongate oblong; tergal portion with tergal style subcylindrical, widened apically with a large flattened spur-like seta apically, a small basal median process, setiferous only on dorsal surface; tergal spurs long, curved and pointed apically; comb arising from ventral wall of bilobed, setiferous dorsal process; anal segment short.

Holotype: BRAZIL:- State of Sao Paulo: Boracea, July 1949 (Lane and Coher).

Observations: This species is most closely related to the Chilean species jaffuelensis and coxalis from which it may be distinguished by the unbranched condition of the subcosta and the form of the terminalia. In Freeman's key this species would run to falcifera, however if the subcosta were branched, this species would run to the couplet containing coxalis and jaffuelensis. It is the first species of the Mycomyiini outside of the Chilean subregion that shows affinities with that subregion. It appears to have characters of the terminalia that are intermediate for forcipata, longistila, coxalis, jaffuelensis, pectinata and _taurus_. The tergal portion of the terminalia resembles the form found in _forcipata_, _longistila_ and _jaffuelensis_ while the sternal portion resembles the form found in _pectinata_ and _taurus_.

<u>Mycomyia</u> <u>meridionalis</u> Johannsen,1910.

1896. <u>Sciophila</u> <u>diluta</u> Williston, Trans. Ent. Soc. London: 263, 2 males; Pl.8, fig.17(wing) -- WEST INDIES. Homonym.

1909. <u>Mycomya</u> <u>diluta</u>, Johannsen, Genera Insectorum 93:47 -- new combination.

1910. <u>Mycomya</u> <u>meridionalis</u> Johannsen, Maine Agric. Exp. Sta. Bull. 180:182 -- new name.

I cannot place this species. It may belong to the unspurred group of <u>Mycomyia</u>.

imitans group

Head: with ocellar bristles reaching slightly beyond ocelli; clypeus with scattered setae which are longest on anteclypeus; first flagellar segment longer than scape plus pedicel; apical dorsal seta of pedicel never more than half as long as first flagellar segment; palpus yellowish.

Thorax: pleura yellowish; coxae yellowish; mesocoxal spur one-fourth as long as coxa, apex dark and recurved; Sc branched, Sc_2 ending in R_{1-2-3}.

Abdomen: TVI and TVII dark; TVIII very narrow, arcuate, ribbon-like, bare; SVIII subtriangular, bare.

Terminalia: tergal portion with small base, all processes borne on a narrow median area, median pair of processes, dark, subcylindrical with a subapical, flattened spur.

<u>Mycomyia</u> <u>borinquensis</u> n.sp.

Male: Head with vertex occiput yellow-brown; frons yellowish or yellow-brown; clypeus yellowish with setae on anteclypeus, like those on palpi; antenna with scape, pedicel and first flagellar segment yellowish.

Thorax: mesonotum with disc suffused or with narrow light acrostichal stripe between two dark stripes, sublateral stripes poorly developed laterally and humeri light; scutellum dark, with small scattered setae and four large scutellar setae; postnotum suffused medianly; legs broken, combs 1-2-missing; wing with Sc_2 ending in apical portion of R_{1+2+3}, apical half of Sc setose; M_1, M_2, M_4, Cu and Cu_1 setose, M_{1+2} bare; fM_{1+2} distad of cell R_3; posterior fork basad of cell R_3 or below Rs.

Abdomen: TI dark dorsally; TII-TV antero-lateral corner light.

Terminalia: (figs.97,98,99); outer style digitiform, setiferous; inner style somewhat flattened, shallowly and subapically bifid with fine subapical setae, two short stout setae midway on dorsal surface; sternal lobe with a pointed apical process at base of inner style, apically setiferous, a small bare subcylindrical curved process on median margin, a bifid dorsal process apically, outer bare, subcylindrical, strongly angulated medianly, inner subtriangular, bare, weakly bifid subapically; inner process narrow hook-like; aedeagus short broad hook-like; subaedeagal rod somewhat Y-shaped; tergal portion with spatulate-shaped tergal process, setiferous with short fine setae along apical and median margin; a median bilobed, setiferous process; outer process flattened, subtriangular with several strongly appressed apical setae; inner style subcylindrical with two apical flat hooks, lateral tergal process subovate, concave; anal segment with two strong lobes with a lateral subtriangular process strongly setiferous apically and a setiferous narrow subcylindrical basal process.

Holotype: PUERTO RICO: Maricao, Nov.13,1935 (G.S. Tulloch).

Paratypes: PUERTO RICO: 1 male, Mayaguez, May 12,1936 (G.S. Tulloch); BRAZIL:- Sao Paulo: 1 male, Itaporanga, Jan.1946 (Barretto); Mato Grosso: 1 male, Salobra, July 1939 (Exped. Clube Zool. Bras.); Goiaz: 3 males, Corumba, Nov.1945 (Barretto).

Observations: This is the first species of Mycomyia known to me from Puerto Rico. It is most closely related to imitans from which it differs by the form of the terminalia, particularly the sternal processes. No other species yet known has a bifid inner style such as the one exhibited.

campestra group

Head: with ocellar bristles reaching slightly beyond ocelli; clypeus setiferous, setae on anteclypeus longest; first flagellar segment longer than scape plus pedicel; apical dorsal seta of pedicel about one-third as long as first flagellar segment.

Thorax: pleura suffused; mid and hind coxa slightly suffused laterally; foretibia about one-fourth longer than forebasitarsus; mesocoxal spur bifid, about one-third as long as coxa; combs 1-0-2; Sc branched, Sc_2 ending in R_{1+2+3}.

Abdomen: TVIII narrow, ribbon-like, bracket-shaped with setiferous posterior margin; SVIII subtrapezoidal, bare.

Terminalia: tergal portion with a pair of lateral, subcylindrical, apically flared styles and a pair of flattened median lobes.

Mycomyia campestra n.sp.

Male: Head with vertex, occiput and postfrons fuscous; prefrons and clypeus brownish to yellowish, setae on postclypeus like those on palpus, those on anteclypeus larger; antenna with scape, pedicel and at least base of first flagellar segment light; palpus yellowish to fuscous.

Thorax: pronotum, paratergite, postspiracular plate and metaepisternum lighter than other parts of pleura; mesonotum with median dark stripes fused anteriorly, sublateral stripes prominent, humeri and sides lighter, scutellum color of pleura, with small scattered setae and four large scutellar setae; postnotum color of pleura; mid and hind coxa slightly suffused; mesocoxal spur with inner portion flattened, rounded apically, setiferous, outer portion flattened, setiferous, broader than inner arm and with an apical brush of short dark setae; wing with Sc_2 ending at or slightly before middle of R_{1+2+3}, Sc apically setose; M_1, M_2, M_4, Cu and Cu_1 setose, M_{1+2} bare; fM_{1+2} distad of cell R_3; posterior fork below Rs.

Abdomen: TI dark dorsal saddle; TII-TV with successively more poorly developed light posterior margin; TVI and TVII dark.

Terminalia: (figs.100,101); outer style flattened, almost kidney-shaped, ventral surface setiferous; inner style bifid, base large, outer arm a short curved process with stout, pointed apical seta, inner arm longer, somewhat flattened with several stout, short, curved apical peg-like setae and finer long subapical setae; sternal lobe with apical margin concave, a short hook-like setiferous process at apical median margin; inner process rounded apically with a subapical hook-like process; subaedeagal rod Y-shaped; tergal portion with tergal process subcylindrical basally, apical portion membranous, flared, scoop-shaped; median dorsal wall with a pair of setiferous subtriangular lobes; anal segment short.

Holotype: BRAZIL:- State of Sao Paulo: Campos do Jordao, August 1949 (Lane).

Paratopotypes: 12 with same data as holotype.

Observations: This species is closely related to no known species. It may be differentiated by the form of the terminalia from all known species. The bifid mesocoxal spur is also hightly distinctive.

Species Described from Female Specimens Which Cannot Be Correlated with any Known Male Specimens

Mycomyia peruviana Edwards, 1931.

1931. Edwards, Ann. Mag. Nat. Hist. 7:258, 2 females -- PERU.

I have seen the paratype specimen of this species. In addition to the characters cited by Edwards, this species also shows Sc forked with the apical half setose. All other veins are bare with Cu_1 bearing two setae on one wing. The first flagellar segment is subequal to the scape plus pedicel. Ocellar bristles long, reaching beyond ocelli.

Species Which Cannot Be Determined From the Original Description

Mycomyia lutea Enderlein, 1911.

1911. Enderlein, Stettin. Ent. Zeit. 72:161, 3 females -- BRAZIL.

Mycomyia lutea var. dorsimacula Enderlein, 1911.

1911. Enderlein, Stettin. Ent. Zeit. 72:162, 1 male -- BRAZIL.
1941. Edwards, Rev. Ent. 12:307 -- in discussion of M. clavata.

Mycomyia brevifurcata Enderlein, 1911.

1911. Enderlein, Stettin. Ent. Zeit. 72:162, 3 females -- BRAZILZ

Mycomyia clavata (Lynch-Arribalzaga), 1892.

1892. *Sciophila clavata* Lynch-Arribalzaga, Bol. Acad. Nac. Cienc. Cordoba 12:417, males, females -- ARGENTINA.

1902. Kertesz, Cat. Dipt. 1:58.

1941. Edwards, Rev. Ent. 12:307, females? -- BRAZIL.

Discussion of Unrecognized Species

In Edwards' 1940 paper on Neotropical *Neoempheria* he found that one of Enderlein's species, represented by four Co types, was actually four species. It seems likely that a similar situation exists in the last four species listed above. As far as *M. peruviana* is concerned, there is as good a chance that the two female speciemens are two species as one. For the above reasons, as well as those set forth in earlier portions of this paper, these species are not given more than mention in this paper.

*Chilean *Mycomyia*

In November-December 1926 an expedition to Chile-Patagonia, headed by two Dipterologists, was undertaken by the Argentine and British governments. It was hoped that evidence might be obtained that would bear on the problems of distribution of the fauna of the subregion, particularly in reference to the similar fauna of New Zealand and parts of Australia. On this trip, 40,000 insects were collected of which 30,000 were Diptera. F.W. Edwards concentrated on collecting the Nematocera, and after his death Freeman (1951) published a study of the fungus gnats collected by Edwards and his wife. Interesting accounts of the trip may be found in Edwards (1927,1928,1929a,1929b) and Edwards and Shannon (1927). Almost all the material studied for this paper is that collected by the Shannons and unless noted, they are the collectors of all material listed.

Groups with large numbers of species such as occur in the other subregions are not yet evident in the Chilean subregion. No group contains more than a few species while most groups are composed of a single species. These groups will be indicated but not delimited since I have seen specimens of only about one-half the total number of known species in the subregion.

Freeman's key to *Mycomyia* appears to be quite satisfactory for all the species known to me. Only one type of variation in a single species has been noted that could affect a character used in the key.

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* Chilean subregion.

This variation is mentioned under the discussion of *M. bifida* and *M. coxalis*.

The following discussion includes two new species and new distribution records or additional material for some of the twenty-seven(27) species recognized by Freeman.

chilensis group

1. *Mycomyia chilensis* (Blanchard), 1852.

1852. *Sciophila chilensis* Blanchard, *IN* Gay, Hist. Fis. Polit. Chile Zool. 7:347 ----- CHILE.

1865. *Sciophila chilensis*, Philippi, Verh. Zool.-Bot. Ges. Wien 15:624 ----- CHILE.

1883. *Sciophila chilensis*, Bigot, Miss. Scient. Cap Horn, Zool. II, 6:13,17 ----- Tierra del Fuego.

1892. *Sciophila chilensis*, Lynch-Arribalzaga, Bol. Acad. Nac. Cienc. Cordoba 12:421 - summary of references of other workers.

1900. *Sciophila chilensis*, Hunter, Trans. Amer. Ent. Soc. 26:275 -- catalogue.

1909. *Sciophila chilensis*, Johannsen, Genera Insectorum, 93:38.

1946. *Sciophila chilensis*, Stuardo O, Cat. Dipt. Chile:56 -- catalogue.

1951. Freeman, Dipt. Patagonia and South Chile III:31(key to species); 32, males and females, Pl.II, fig.10 and Pl.III, fig.12(male terminalia); Pl.X,fig.75(mesocoxal spur) ----- ARGENTINA; CHILE ----- common species of *Mycomyia* chosen as Blanchard's species.

Freeman's interpretation of this species is followed to avoid confusion in the group. In addition to the characters already ascribed to the species the following setal characteristics of the wing are added. M_1, M_2, M_4, Cu and Cu_1 setose, apical one-fourth to one-third setose.

Additional records: CHILE:- 2 males, Maullin, April 30,1942 (C.E. Porter); 3 males, Panginpalli, April,1924 (?Faz); 2 males, Angol, 1 no date, 1 July 25,1952 (D.S. Bullock).

Additional specimens: CHILE:- 1 male, Marga Marga, Nov.1927 (Jaffuel and Pirion); ARGENTINA:- 1 male, Porto Blest, Dec.2,1926 (R. and E. Shannon); 3 males, Rio Negro, Bariloche, Nov.1926; 1 male, Rio Negro, Correntoso, Nov.1926.

2. _Mycomyia_ _simillima_ Freeman,1951.

1951. Freeman. loc. cit. III: 31(Key to species); 33, 7 males, Pl.II, fig.11 and Pl.III, fig.13(male terminalia) ------ ARGENTINA.

subfusca group

3. _Mycomyia_ _subfusca_ Freeman,1951.

1951. Freeman. loc. cit. III: 31(Key to species); 33, 15 males, 17 females, Pl.III, figs.14,16(male terminalia) ------ ARGENTINA(male holotype); CHILE.

In addition to the characters already ascribed to the species, the following setal characteristics of the wing are added. M_1, M_2, M_4, Cu_1 and apical fourth of Cu and Sc setose.

Additional specimens: ARGENTINA:- 2 males, Rio Negro, Correntoso, Nov.1926; 2 males, Rio Negro, Bariloche, Nov.1926.

4. Mycomyia ochracea Freeman,1951.

1951. Freeman. loc. cit. III:31(key to species); 34, 7 males, 6 females, Pl.III, figs.15,17(male terminalia) ----- CHILE(male holotype); ARGENTINA.

In addition to the characters already ascribed to the species, the following setal characteristics of the wing are added. M_1, M_2, M_4 and Cu_1 setose; Sc and Cu variable, Sc with a pical half or apical fifth setose and Cu with apical fifth setose or completely setose.

Additional records: CHILE:- 1 male, Angol (D.S. Bullock).

bifida group

5. Mycomyia bifida Freeman,1951.

1951. Freeman. loc. cit. III:31(key to species); 34, 7 males, 9 females, Pl.IV, fig.18(male terminalia); Pl.X, fig.78(male meso-coxal spur) ----- ARGENTINA(male holotype); CHILE.

In addition to the characters already ascribed to the species, the following setal characteristics of the wing are added. M_1, M_2, M_4, Cu_1 and apical half of Cu and Sc setose. My specimens also show one difference from the original description, that is, the anterior basitarsus is subequal to the second tarsal segment, not longer.

Additional specimens: ARGENTINA:- 4 males, Rio Negro, Correntoso, Nov.1926.

6. Mycomyia lamellata Freeman,1951.

1951. Freeman. loc. cit. III:32(key to species); 35, 3 males, Pl.IV, fig.19(male terminalia); Pl.X, fig.76(male mesocoxal spur) ----- ARGENTINA(male holotype); CHILE.

trichops group

7. Mycomyia trichops Freeman,1951.

1951. Freeman. loc. cit. III:32(key to species); 35, 2 males, Pl. IV, figs.20,21(male terminalia); Pl.X, fig.77(male mesocoxal spur) ----- CHILE.

8. Mycomyia spinifera Freeman,1951.

1951. Freeman. loc. cit. III:32(key to species); 36, 3 males, Pl.IV, fig.22,23(male terminalia); Pl.X, fig.79(male mesocoxal spur) ----- CHILE.

9. Mycomyia fuscicornis Freeman,1951.

1951. Freeman. loc. cit. III:31(key to species); 36, 1 male, Pl.IV, figs.24,25(male terminalia); Pl.X, fig.81(male mesocoxal spur ----- CHILE.

spinosa group

10. *Mycomyia spinosa* Freeman, 1951.

1951. Freeman. loc. cit. III:31(key to species); 36, 2 males, Pl.IV, figs.26,27,28(male terminalia) ----- CHILE.

basinerva group

11. *Mycomyia basinerva* Freeman, 1951.

1951. Freeman. loc. cit. III:32(key to species); 37, 17 males, Pl.V, figs.29,30,31,32(male terminalia); Pl.X, fig.80(male mesocoxal spur) ----- ARGENTINA.

12. *Mycomyia ansata* Freeman, 1951.

1951. Freeman. loc. cit. III:32(key to species); 38, 32 males, Pl.V, figs.33,34,35(male terminalia) ----- ARGENTINA.

In addition to the characters already ascribed to the species, the following setal characteristics of the wing are added. M_1, M_2, M_4, Cu_1 and apical half of Cu and Sc setose.

Additional specimens: ARGENTINA:- 5 males, Rio Negro, Bariloche, Nov.1926.

13. *Mycomyia funebris* Freeman, 1951.

1951. Freeman. loc. cit. III:32(key to species); 38, 2 males, Pl.V, figs.36,37(male terminalia) ----- CHILE.

In addition to the characters already ascribed to the species, the following setal characteristics of the wing are added. M_1, M_2, M_4, Cu_1, apical fourth of Sc and apical fourth to half of Cu setose.

Additional records: ARGENTINA:- 9 males, Rio Negro, Bariloche, Nov. 1926; 2 males, Rio Negro, Correntoso, Nov.1926.

flavescens group

14. Mycomyia flavescens Freeman,1951.

1951. Freeman, loc. cit. III:31(key to species); 38, 1 male, Pl.VI, figs.40,41(male terminalia) ----- ARGENTINA.

valdiviana group

15. Mycomyia valdiviana group

1865. Sciophila valdiviana Philippi. Verh. Zool.-Bot. Ges. Wien 15:624 ----- CHILE.

1900. Sciophila valdiviana Hunter. Trans. Amer. Ent. Soc. 26:275 ----- catalogue.

1909. Sciophila valdiviana Johannsen. Genera Insectorum, Fasc. 93:40.

1946. Sciophila valdiviana, Stuardo O. Cat. Dipt. Chile:57 --- catalogue.

1951. Freeman. loc. cit. III:31(key to species); 39, males and females, Pl.VI, figs.38,39(male terminalia) ----- ARGENTINA; CHILE ----- species placed.

Freeman's interpretation of this species is followed. By accepting his interpretation, unless a type proves to be a different species, confusion in nomenclature can be avoided.

infuscata group

16. Mycomyia infuscata Freeman,1951.

1951. Freeman. loc. cit. III:30(key to species); 39, 1 male, Pl.VI, figs. 42,43(male terminalia) ----- CHILE.

inermis group

17. Mycomyia inermis Freeman,1951.

1951. Freeman. loc. cit. III:30(key to species); 40, 11 males, 5 females, Pl.VII, figs.44,45,46(male terminalia) ----- ARGENTINA(male holotype); CHILE.

In addition to the characters already ascribed to the species, the following setal characteristics of the wing are added. M_1, M_2, M_4, Cu_1, and apical half of Cu and Sc setose.

Additional specimen: ARGENTINA:- 1 male, Porto Blest, Dec.2,1926.

falcifera group

18. *Mycomyia falcifera* Freeman,1951.

1951. Freeman. loc. cit. III:31(key to species); 41, 17 males, 2 females, Pl.VII, figs.47,48,49(male terminalia) ----- ARGENTINA (male holotype).

In addition to the characters already ascribed to the species the following setal characteristics of the wing are added. M_1, M_2, M_4, Cu_1, apical half of Cu and apical half to third of Sc setose.

Additional record: CHILE:- 1 male, Concepcion, Oct.1927 (Jaffuel and Pirion).

Additional specimens:- ARGENTINA:- 5 males, Rio Negro, Correntoso, Nov.1926.

cylindrica group

19. *Mycomyia cylindrica* Freeman,1951.

1951. Freeman. loc. cit. III: 31(key to species); 41, 2 males, 1 female, Pl.VII, figs.50,51,52(male terminalia) ----- CHILE(male holotype); ARGENTINA.

forcipata group

20. Mycomyia forcipata Freeman, 1951.

1951. Freeman, loc. cit. III:32(key to species); 42, 11 males, 4 females, Pl.VIII, figs.53,54(male terminalia) ------ ARGENTINA(male holotype).

In addition to the characters already ascribed to the species, the following setal characteristics of the wing are added. M_1, M_2, M_4, Cu_1, apical half of Cu and Sc setose.

Additional specimens: ARGENTINA:- 2 males, Rio Negro, Bariloche, Nov.1926.

21. Mycomyia longistila Freeman, 1951.

1951. Freeman. loc. cit. III:32(key to species); 42, 18 males, 7 females, Pl.VIII, figs.55,56(male terminalia) ------ CHILE(male holotype); ARGENTINA.

In addition to the characters already ascribed to the species the following setal characteristics of the wing are added. M_1, M_2, M_4, Cu_1, apical half of Cu and Sc setose.

Additional specimens: CHILE:- 1 male, Puerto Varas, Dec.1926; 1 male, Rio Negro, Correntoso, Nov.1926 coxalis group

22. *Mycomyia coxalis* Freeman,1951.

1951. Freeman. loc. cit. III:32(key to species); 43, 15 males, 1 female, Pl.VIII, figs.57,58(male terminalia) ----- ARGENTINA(male holotype).

In addition to the characters already ascribed to the species, the following setal characteristics of the wing are added. M_1, M_2, M_4, Cu, Cu_1 and apical third to half of Sc setose. My specimens also show one difference from the original description, that is, the anterior tibia is not more than one and one-fourth or one-fifth longer than anterior basitarsus. It is noted by Freeman to be one and one-third to one-half times as long as the basitarsus.

Additional records: ARGENTINA:- 2 males, Rio Negro, Bariloche, Nov.1926.

23. *Mycomyia jaffuelensis* Freeman,1951.

1951. Freeman. loc. cit. III:32(key to species); 43, 3 males, 2 females, PlVIII, figs.59,60(male terminalia) ------ CHILE(male holotype).

In addition to the characters already ascribed to the species, the following setal characteristics of the wing are added. M_1, M_2, M_4, Cu_1, apical half of Cu and Sc setose.

Additional records: CHILE:- 1 male, Concepcion, Oct.1927 (Jaffuel and Pirion).

pectinata group

24. Mycomyia pectinata Freeman,1951.

1951. Freeman. loc. cit. III:31(key to species); 43, 2 males, 1 female, Pl.VIII, figs.61,62,63(male terminalia) ------ ARGENTINA(male holotype).

taurus group

25. Mycomyia taurus Freeman,1951.

1951. Freeman. loc. cit. III: 31(key to species); 44, 6 males, Pl.IX, figs.64,65,66,67(male terminalia) ------ ARGENTINA(male holotype); CHILE.

26. Mycomyia divisus Freeman,1951.

1951. Freeman. loc. cit. III:31(key to species); 45, 7 males, Pl.IX, figs. 68,69,70(male terminalia) ------ CHILE(male holotype); ARGENTINA.

In addition to the characters already ascribed to the species, the following setal characteristics of the wing are added. M_1, M_2, M_4 and Cu_1 with setae sparse or numerous; Cu with very few setae to completely setose; Sc with very few setae to apical half setose.

Additional record: CHILE:- 30 males, Angol (D.S. Bullock).

setifera group

27. *Mycomyia setifera* Freeman,1951.

1951. Freeman. loc. cit. III:31(key to species); 45, 3 males, 1 female, Pl.IX, figs.71,72,73,74(male terminalia) ----- CHILE(male holotype).

portoblest group

Head: ocellar bristles damaged; clypeus with short, fine setae; first flagellar segment longer than scape plus pedicel; apical dorsal seta of pedicel one-third as long as first flagellar segment; palpus weakly developed.

Thorax: large pleural sclerites dark; hind coxa suffused laterally; foretibia and forebasitarsus subequal; mesocoxal spurs reaching to mouthparts and with two apical spines; Sc branched, Sc_2 ending in R_{1+2+3}.

Terminalia: tergal portion with tergal style forceps-like; a median trilobed process.

28. Mycomyia portoblest n.sp.

Male: Head fuscous above, clypeus and palpi yellow, short fine setae on both, those on clypeus shorter and finer;

Thorax: pleura largely fuscous; anterior and posterior pronotum, paratergite, postspiracular plate, proepisternum and proepimeron yellow; mesonotum dark, humeral area light, acrostichal stripe somewhat in evidence; scutellum and postnotum dark, former with scattered short, fine setae and four large scutellar setae; coxae and femora yellow; comb between spurs on midtibia sparse; Sc_2 ending at middle of R_{1+2+3}; Sc with apical two-fifths setose; M_{1+2} bare; M_1, M_2, M_4, Cu and Cu_1 setose; M_{1+2} shorter than M_2 or Cu_1; fM_{1+2} distad of R_4; posterior fork basad of fR; haltere yellowish.

Abdomen: fuscous, posterior margin of segments appearing lighter; SVIII subtriangular, apex rounded, bare; TVIII arcuate; posterior margin protruberent medianly, setose, base somewhat enlarged.

Terminalia: (figs.102,103); outer style of sternal portion absent, middle sternal process bifid, apex of shorter portion setuliferous, outer portion with an apical spur; inner sternal process flattened, elongate with an apical hood; ventral sternal lobe small, setiferous; a large subtriangular, flattened sclerite laterally which joins sternal and tergal portions; tergal portion with outer style forceps-like, setuliferous with a basal median setiferous lobe, the setae long; base with median posterior portion tri-lobed, lateral lobes narrow, slightly clubbed and setoferous apically, median lobe rounded distally, setuliferous; anal segment short and broad.

Holotype: ARGENTINA:- Rio Negro, Porto Blest, Dec.2,1926.

Observations: This species is not closely related to any other species of Mycomyia presently known. As far as can be determined from present information, it belongs to a group which is restricted to Patagonia. In Freeman's key this species runs to the chilensis - simillima couplet.

pauperculus group

Head: ocellar bristles reaching halfway to base of antennae.

Thorax: fuscous; foretibia almost one and one-half times as long as forebasitarsus; mesocoxal spur absent; Sc branched, Sc_2 ending in R_{1+2+3}.

Terminalia: tergal portion with three pairs of combs and a pair of long lateral setae as in the tantilla group (Group C of Coher,1952).

29. Mycomyia pauperculus n.sp.

Male: Head fuscous, ocellar bristles moderately long, palpi reddish-yellow, antennae damaged.

Thorax: fuscous; scutellum with four large setae; several large, long setae at median antero-apical margin of forecoxa; coxae reddish-yellow, legs broken except one foreleg; foretibia one and four-tenths the length of forebasitarsus; mesocoxal spur absent; wing with Sc setiferous distally and ending in middle of R_{1+2+3}; M_1, M_2, M_4, Cu and Cu_1 setose, M_{1+2} bare; M_{1+2} subequal to M_2 and Cu_1; posterior fork below cell R_3.

Abdomen: fuscous; TVIII narrow, setiferous, arcuate; SVIII subtriangular with excavated lateral margins.

Terminalia: (figs.104,105); outer style divided into several apical lobes; lateral lobe setiferous with a distal hook-like process; median lobe flattened, bent apically, expanded, with many small setae along apical median margin; inner lobe simple, subcylindrical with apical setae; a trifid process halfway from base, one prong flattened, setiferous; aedeagus elongate, narrow; tergal portion with a pair of long lateral setae on each side, an apically bent process with a curved fringe of setae joined to their base; anal ring modified and immovably attached to basal portion, lateral anterior process and basally fused posterior process with apical fringe of setae; anal segment short and broad.

Holotype: CHILE:- Santiago, Marga Marga, Sept.19,1927 (Jaffuel and Pirion).

Observations: This species seems to be related to species of the <u>tantilla</u> group (group C of Coher,1952), the tergal portion being somelike that of <u>irene</u>. All parts of the terminalia are, however, distinct from any other described species. Depending on the type of tibial combs w hich may be found to be present on the mid and hind legs, this species would run only to one of these species in Freeman's key. *M. inermis*, *M. cylindrica*, *M. forcipata* or *M. coxalis*.

NEARCTIC *MYCOMYIA*

The knowledge of the genus *Mycomyia* in the Nearctic Region is in a very unsatisfactory state, many of the species being unrecognizable from their original description. The confusion may be traced to any one or a combination of factors which have been enumerated in other sections of this paper and are repeated here for emphasis. Males and females are difficult or impossible to correlate and determinations must generally be based on the form of the male terminalia. The females alone are difficult or impossible to separate. Since the early workers in the Diptera did not have a complete knowledge of the group, many of their species are not characterized by morphological differences that are valid for differentiation from other species now known to exist. These "old" species will only be known for certain if a type is found to exist and if the type is a male. For the present, at least, we must place many species in a list of forms of uncertain identity. Because of the number of forms of uncertain identity in this region, nearly fifty percent, a key of even provisional nature is omitted. For the same reason species groups are also omitted for the present.

Besides the aforementioned problems there has been no work relating the Nearctic fauna to that of the Holarctic Region. It seems probable that at least some New World species and European species will prove to be synonymous. Rather than synonymize species of which I have not seen the European types of material compared with the types, I will indicate possible synonymies or relationships. It is felt that less confusion will result from this practice.

The first Nearctic species of Mycomyia known to science are credited to Say (1824) who described three species of Sciophila which were later placed in Mycomyia by Johannsen (1909,1910). It would be unwise to tamper with Johannsen's interpretation of the species since this would only create confusion (1) by leaving Say's names without an identity, and (2) by giving a new name to some of our most commonly collected species. It is interesting to note that the identifiable Loew species of Mycomyia have proved to be commonly collected species. The Loew (1869) species of Sciophila and one species of Polylepta are are actually Mycomyia as Johannsen (1909) first suggested and as the present study of the types has proved.

Coquillet (1901 to 1905) named four species of Sciophila; all of these were recognized by Johannsen (1909) to belong to Mycomyia. In Johannsen's work the specific name brevivitta was mistakenly transposed as brevivittata, an error that has been perpetuated by all subsequent workers.

Adams (1903) described two species of Sciophila which have been considered to be Mycomyia. Their identity is not settled.

Johannsen (1909) listed the species of Mycomyia, and in that work many Sciophila (sensu Winnertz) were placed in Mycomyia Rondani(1856) which was recognized in the 1909 paper for the first time. In 1910, Johannsen published the first comprehensive work on American Mycomyia; twenty-five(25) species and four varieties were treated. Two of the varieties were named and types indicated in the manner of subspecific designations. The available types of the Johannsen species have been examined. Johannsen's final publication relating to this group was in a paper (1926) in which he examined Walker's types of North American fungus gnats and found that Leia unicolor Walker, 1848 is a female Mycomyia.

Sherman (1921) described a single species from British Columbia, though the identity of the species is not settled.

Garrett (1924) in two papers on "British Columbian Mycetophilidae" included the descriptions of sixteen species of Mycomyia. The species entitled Mycomya oviducta new species, is quite evidently a Boletina and the name should be considered a lapsus calami. At present I can recognize only four of his species, these from paratypes metatypes distributed by the author.

Van Duzee (1928) published an account of Californian and Alaskan fungus gnats which included the description of seven new species of Mycomyia. I have seen the holotype of five of these. The identity of M. californica and M. fuscipalpis remains unsettled.

Fisher, in a series of papers, added to the knowledge of the group. In 1937 she described nine new species, figured the male terminalia of M. hirticollis and gave a key to the males of the eastern species of Mycomyia. In 1938 she described one more new species and in 1943 she figured the male terminalia of M. flavohirta which she then considered to be a Neoempheria. In 1952 she co-authored a paper with Shaw on the fungus gnats of Connecticut; a key to the species of Mycomyia was included and flavohirta was again treated as a species of Mycomyia.

Shaw described one new species of Mycomyia in 1940 and in 1941 described three more. In 1947 he made a study of variation of the wing venation in M. obliqua while in 1940 he illustrated and mentioned an abnormal venation in M. imitans.

The most serious obstacle to completion of the study of Nearctic Mycomyia is the complete unavailability of the Garrett holotypes. Out of a total of sixteen species of Mycomyia described by him, twelve are still not recognized. The other four species have been placed by examination of specimens other than the holotypes. When the types are in existence, as Garrett's are, this is an unsatisfactory procedure.

In addition, three species of Johannsen and two species of Loew are known to me only by the female types. The single Walker species is also described from a female. I have not seen the specimen. One other species was described from a female by Adams and I have not seen the type of this species either. Adams, Sherman, Coquillet and Johannsen have each described one species from male specimens. I cannot recognize their species. Van Duzee has two species in this same category.

In summation the, I can now recognize thirty-one species from specimens. Four others would probably be recognized if I had specimens. Twenty-five species are known only by name or by female specimens.

Mycomyia obliqua(Say),1824.

1824. Sciophila obliqua Say, App. Long's Exped. St. Peter's River 2:363, male ----- N.W. TERRITORY.

1828. Sciophila obliqua, Wiedemann, Aussereur. zweiflug. Ins. 1:63 ----- N.W. PENNSYLVANIA.

1869. Sciophila obtruncata Loew, Berl. Ent. Zeit. 13:139, male (MCZ-1222) ----- WASHINGTON, D.C. New synonymy.

1909. Mycomya obliqua, Johannsen, Genera Insectorum 93:49 ----- new combination.

1909. Mycomya obtruncata, Johannsen, Genera Insectorum 93:49 ----- combination.

1910. Mycomya obliqua, Johannsen, Maine Agric. Exp. St. Bull. 180:166 (key to males); 169(key to females); 174; fig.102(wing), fig.133(male terminalia) ----- NEW YORK; RHODE ISLAND; MASSACHUSETTS; NEW HAMPSHIRE; WISCONSIN; QUEBEC PROVINCE. Identity to species.

1910. Mycomya obtruncata, Johannsen, Maine Agric. Exp. St. Bull. 180: 166(key to males); 172.

1937. Fisher, Jour. N.Y. Ent. Soc. 55:392(key to males).

1937. Mycomyia obtruncata, Fisher, loc. cit. 55:391(key to males).

1947. Shaw. Amer. Mid. Nat. 38:708; fig.1(wing variation).

1952. Mycomya obliqua, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No. 80:190(key to species) ----- MAINE; NEW HAMPSHIRE; MASSACHUSETTS; NEW YORK; RHODE ISLAND.

This is one of the most common species of fungus gnats in the northern and eastern part of the region. I have examined the type of M. obtruncata and I find that it is a male and that the terminalia are typical of the species M. obliqua. Variation in the form of the male terminalia of M. obliqua apparently follows no distributional lines and is not very great for any of the structures. The European species M. circumdata Staeg.,1840 may be a synonymic species. The Neotropical species M. austrobliqua described in this paper is very closely allied.

Tennessee: 3L, Beech Gap, Gatlinburg, GSMNP, 5500', July 18,1947,
R.H. Whittaker, 7 males
3E, Hemlock For., Gatlinburg, GSMNP, 4000', July 13, 1947
R.H. Whittaker, 1 male
1F, Pine-oak For., Gatlinburg, GSMNP, 1500', July 17,1947,
R.H. Whittaker, 1 male

North Carolina: Mt. Mitchell, Black Mts., 5000-6711', Sept.4-7,1930
N. Banks, 1 male
no data, 1 male

Virginia: Great Falls, June 1922, J.M. Aldrich, 1 male
Prospect Hill, Sept. 14, 1920, C.T. Greene, 1 male

West Virginia: White Sulphur Springs, Sept.25,1915, F. Knab, 1 male

Washington, D.C.: type of obtruncata

Maryland: Glen Echo, July 2,1922, J.R. Malloch, 2 males
Takoma Pk., July 6,1944, H.K. Townes, 1 male
Plummer's Is., June 20, 1912, H. Barber, 1 male
Beaver Dam Run, Baltimore Co., July 7,1940, E.G. Fisher,
1 male

New Jersey: Riverton, July 3, C.W. Johnson, 1 male

Pennsylvania: Laurelton, Aug.4, N. Banks, 2 males
North Mt., Sept.1, C.W. Johnson, 1 male
Castle Rock, June 30, H. Skinner, 2 males
Hazleton, Luzerne Co., Sept.6,1912, W.G. Dietz, 1 male
" " " " 17,1914, " 1 "

Rhode Island: Kingston, 2 males

Connecticut: Beacon Falls, Sept.12,1933, C.P. Alexander, 1 male

Massachusetts: Amherst, Aug.28,1951, E.I. Coher, 2 males
" " 29 " " 1 male
" " 30 " " 2 males
Sunderland, Sept.20,1951, " 1 male
" Mt. Toby, Sept.28,1950, E.I. Coher, 4 males
" " " " " " T. Farr, 1 male
" Cranberry Pond, Sept.20,1951, E.I. Coher, 1 male
Sunderland, " " Oct.1,1951, E.I. Coher, 1
" " " " 15 " " 1 male
Leverett, July 12,1952, T. Farr, 1 male
" Sept.16 " E.I. Coher, 1 male
" " 20 " " 4 males
" " 22 " " 3 "
Montague, " 8 " " 1 male
Cummington, " 30,1950 " 1 "
Mt. Everett, July 24,1948, " 2 males
Dedham, Sept.8, C.W. Johnson, 1 male
Auburndale, " 20, " 3 males
Holliston, " 15, N. Banks, 1 male
Woods Hole, July 25, C.W. Johnson, 3 males
Brewster, July 16,1941, Fraker, 1 male
Martha's Vineyard, Aug.22, C.W. Johnson, 1 male

New Hampshire: King's Rav. Tr., White Mts., Aug.26,1935, C.P. Alexander, 3 males
King's Rav. Tr., White Mts., " " " W. Harrison, 3 males
King's Rav. Tr., White Mts., 1700', Sept.6,1940, M. Hanson, 1 male
King's Rav. Tr., White Mts., 1800', " " " V. LaFleur, 1 male
King's Rav. Tr., White Mts., 1800', Oct.12,1940, E. King, 4 males

King's Rav. Tr., White Mts., 1800', Oct.12,1940, F.E. Smith, 5 males
" " " " " 2000' " " " J.F. Hanson, 1 male
" " " " " " " " " F.E. Smith, 1 "
" " " " " 2500' " " " J.F. Hanson, 2 males
" " " " " " " " " F.E. Smith, 1 male
" " " " " 2800' " " " J.F. Hanson, 3 males
" " " " " 2950' " " " " 1 male
" " " " " 3000' " " " F.E. Smith, 6 males
" " House, " " 1280' " " " J.F. Hanson, 1 male
Ammonoosuc Rav., " " 2700', Sept.5,1940, " 4 males
" " " " " " " " M. Hanson, 2 "
" " " " " " " " V. LaFleur, 1 male
" " " " 3000' " " " J.F. Hanson, 3 males
Tuckerman's Rav. Tr., White Mts., 2100', Sept.4,1940, J.F. Hanson, 3 males
" Rav. Tr., " " 3100' " 2 " " 1 male
" Rav. Tr., " " 3000', Oct.10,1940, J.F. Hanson, 1 male
Huntington Rav. Tr., White Mts., 3000', Aug.4,1944, J.F. Hanson, 1 male
" " " " " 3500', Sept.4,1940, M. Hanson, 1 male
Dolly Copp Camp, White Mts., 1400', J.F. Hanson, 2 males
Osgood Ridge, " " Aug.25,1935, C.P. Alexander, 1 male
Galehead Tr., " " 2000', Aug.31,1951, O.S. Flint, 6 males
" " " " 3000' " " " " 1 male
Twinway-Zealand Mt.," " Sept.1,1951, O.S. Flint, 3 males
Mt. Pleasant, " " " 12,1919, W.D. Batchelar, 1 male

Vermont: Laurel Lake, Aug.3,1934, H.D. Pratt, 1 male

Quebec: Ellis Bay, Anticosti, Aug.24, W.S. Brooks, 1 male
Knowlton, July 26,1929, L.J. Milne, 1 male
Meach Lake, Oct.17,1938, G.E. Shewell, 1 male
Kazubazua, July 19,1927, G.S. Walley, 1 male
" Aug.17 " " 2 males
" July 19, " F.P. Ide, 1 male
Laniel, Aug.30,1939, " 2 males
" " " 1933 1 male
Sept.7,1939 " 1 male
Norway Bay, Aug.26,1938, G.E. Shewell, 1 male
" " " 31 " " 1 male
" " " 30 " G.A. Hobbs, 1 male
St. Jean Riv., Gaspe, Aug.20,1936, E.G. Fisher, 2 males

New Brunswick: Lepreaux Harbor, Aug.31,1951, J.F. Hanson, 1 male

Ontario: Lake of Bays, Norway Point, July 31,1939, J. McDunnough, 1 male
" " " " " Aug.1, " " 1 "
Simcoe, July 1,1939, G.E. Shewell, 2 males

Michigan: Douglas Lake, Aug.12,1922, 1 male

Ohio: Ross Co., July 4,1949, R.R. Dreisbach, 1 male

Indiana: Turkey Run, June 27,1933, A.L. Melander, 1 male

Iowa: Sioux City, July 15,1950, J. Laffoon, 10 males
Ledges St. Pk., June 20,1949, A. Gaston, 1 male
" " " " 25 " J. Laffoon, 1 male
" " " Boone Co., June 21,1950, J. Laffoon, 1 male
" " " " " Oct. 13, " " 2 males
Palisades-Kapler St. Pk., Linn Co., July 8,1950, J. Laffoon, Slater, Hicks, 3 males
White Pine Hollow, Dubuque Co., July 4,1949, J. Laffoon, 3 males
Dolliver Mem. St. Pk., Webster Co., June 30,1950, " 1 male
Lacey-Keosauqua St. Pk., Van Buren Co., Sept.9,1949, J. Laffoon and J. Slatter, 5 males
Des Moines, Polk Co., July 4,1950, J. Laffoon, 1 male

Minnesota: Lake Itasca, Clearwater Co., Sept.1,1950, J. Laffoon, 4 males
" " " " " 2 " " 3 males
" " " " " 3 " " 4 males
" " St. Pk., " 2 " " 9 males
" " " " " 3 " " 4 males
5 miles S.E. Pequot Lakes, " 4,1948, Hicks and Laffoon 1 male

Manitoba: Aweme, Aug.27,1917, N. Criddle, 1 male

Idaho: Priest, Hunt Crk., Sept.1,1919, A.L. Melander, 1 male

British Columbia: N. Westminster, Aug.8,1917, A.L. Melander, 1 male
Cultus Lake, July 29,1948, H.R. Foxlee, 1 male

Mycomyia imitans Johannsen,1910.

1910. Mycomya imitans Johannsen, Maine Agric. Exp. Sta. Bull. 180:167 (key to males); 169(key to females); 177, males, females; figs.132,136 (male terminalia) ----- NEW YORK, RHODE ISLAND(holotype); MASSACHUSETTS, WISCONSIN, BRITISH COLUMBIA(allotype).

1937. Fisher, Jour. N.Y. Ent. Soc. 45:391(key to males).

1940. Shaw, Can Ent. 72:51(description of variation in wing); fig.8 (wing).

1947. Shaw, Amer. Mid. Nat. 38:711(repeated observation in 1940 paper).

1952. Mycomya imitans, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No80:190(key to males) ----- MAINE, MASSACHUSETTS, CONNECTICUT, NEW YORK, RHODE ISLAND.

I have seen the types of this species and there has been some confusion in their designation. The holotype specimen from Rhode Island as well as the allotype from British Columbia are both females. The holotype was chosen in error since Johannsen evidently thought it was one of the males he had studied and the specimen was labelled as a male. Dr. Johannsen has been advised of this error and he will choose a male as the holotype when the material from the type series that I have on loan is returned to the Cornell collection.

There is great variation in the tergal portion of the male terminalia of this species. The variation consists of the presence or absence of a process with all intermediate forms between the least developed type and the most highly developed form of the style.

The variations are not correlated with geographic distribution, the forms appearing randomly throughout the range of the species. There is, however, one exception to this. The British Columbia specimens are of a single constant form and the present distributional notes show that this population is separated from the rest by a wide geographical area. However, rather than consider the population as a genetic entity, i.e. a species or subspecies, it is considered as an intrapopulation variant since the form of the style in the specimens studied is found in specimens from other areas.

North Carolina: Neel's Creek, Mt. Mitchell, May 30,1946, J.F. Hanson, 2 males

Virginia: Dead Run, Fairfax Co., July 28,1915, R.C. Shannon, 1 male

West Virginia: Lost River St. Pk., July 2,1941, A. Stone, 1 male

Maryland: Plummer's Is., June 28,1905, H.S. Barber, 1 male
" " July 21,1907, W.L. McAtee, 1 male
Glen Echo, July 9,1922, J.R. Malloch, 1 male

Pennsylvania: Laurelton, Aug.4, N. Banks, 1 male

New York: S. Wales, July 13,1917, M.C. Van Duzee, 1 male
Colden, Aug.2,1914, " 3 males
East Aurora, Sept.20,1914, " 1 male
Reserve, McLean Bogs, July 26,1925, 1 male
Inlet Brk., McLean Res., June 30,1924, 1 male
Whiteface Mtn., above 4000', Aug.23,1916, 1 male
L. Placid, July 1,1922, J.M. Aldrich, 1 male

Rhode Island: holotype

Massachusetts: Leverett, Sept.12,1952, E.I. Coher, 2 males
" " 13 " " 1 male
" June 14, " " 5 males
Amherst, Aug.28,1951, " 1 male
Montague, Sept.8, " " 1 male
Rowe, July 11,1951, " 2 males
Williamsburg, Aug.7, C.W. Johnson, 1 male
New Bedford, 2 males, paratypes

New Hampshire: Tuckerman's Rav. Tr., White Mtns., 4000', Aug.14,1935, J.F. Hanson, 5 males
Tuckerman's Rav. Tr., White Mtns., 3500', Sept.2,1940, J.F. Hanson, 1 male
Tuckerman's Rav. Tr., White Mtns., 3500', Sept.2,1940, V. LaFleur, 1 male
Tuckerman's Rav. Tr., White Mtns., 4200', Sept.3,1940, J.F. Hanson, 1 male
Tuckerman's Rav. Tr., White Mtns., 5000', Sept.3,1940, V. LaFleur, 1 male
Tuckerman's Rav. Tr., White Mtns., 2500', Sept.4,1940, J.F. Hanson, 1 male
Tuckerman's Rav. Tr., White Mtns., 3000', Sept.4,1940, V. LaFleur, 1 male
Tuckerman's Rav. Bowl, White Mtns., 4000', Sept.3,1940, J.F. Hanson, 2 males
Ammonoosuc Rav., White Mtns., 3000', Sept.5,1940, J.F. Hanson, 1 male
Ammonoosuc Rav., White Mtns., 3000', Sept.12,1940, J.F. Hanson, 1 male
Huntington Rav. Bowl, White Mtns., 4300', Sept.4,1940, M. Hanson, 1 male; J.F. Hanson, 2 males; V. LaFleur, 1 male.
Huntington Rav. Bowl, White Mtns., 3400', Sept.4,1940, J.F. Hanson, 1 male
King's Rav. Tr., White Mtns., 1700', M. Hanson, 2 males
" " " " " 3000', Sept.12,1940, F.E. Smith, 1 male
King's Rav. Tr., White Mtns., Aug.26,1935, C.P. Alexander, 1 male
King's Rav. Appalachia, White Mtns., 1280', Sept.6,1940, J.F. Hanson, 1 male
Snyder Brook, White Mtns., Aug.26,1935, C.P. Alexander, 1 male
Glen House, July 17, C.W. Johnson, 1 male
Mt. Pleasant, White Mtns., Sept.12,1917, W.D. Batchelar, 1 male
White Mtns., Morrison, 2 males

Vermont: Battell St. Pk., July 17,1952, E.I. Coher, 1 male
Lake Willoughby, 1400', June 17-29,1945, C.P. Alexander, 2 males

Maine: Mt. Desert, Canada Brook, June 17,1935, C.P. Alexander, 1 male
" " Canon " " 24 " " 1 male
" Katahdin, 3000', July 28,1951, O.S. Flint, 2 males

Nova Scotia: Sherbrooke, Guysborough Co., June 29,1951, C.P. Alexander, 1 male
Cape Breton, Victoria Co., Beinn Bhreagh, 500', July 1, 1951, C.P. Alexander, 1 male
Five Islands, Minas Basin, Colchester Co., June 25,1951, C.P. Alexander, 2 males

Quebec: Anticosti, Ellis Bay, Aug.24, W.S. Brooks, 1 male
Abbotsford, June 14,1937, G. Shewell, 1 male
" Aug.24,1936, " 1 male
" Sept.2,1936, " 1 male
Laniel, July 3,1944, A.R. Brooks, 1 male
Gt. Whale R., Aug.31,1949, J.R. Vockeroth, 1 male

Ontario: Simcoe, June 6,1939, G.E. Shewell, 2 males

Iowa: Ledges St. Pk., Boone Co., July 29, 1950, J. Laffoon, 1 male
" " " June 20,1949, A. Gaston, 1 male; I. Norman, 1 male
" " Pk., Boone Co., June 21,1950, J. Laffoon, 1 male
" " " " " " 25 " " 20 males
Dolliver Mem. St. Pk., Webster Co., June 30,1950, J. Laffoon, 2 males
Maquoketa Cave St. Pk., Jackson Co., July 3,1949, J. Laffoon, 1 male

British Columbia: Cultus Lk., July 13,1948, H.R. Foxlee, 3 males
" " " 7 " " 1 male
Robson, July 3,1947, " 1 male
Selkirk Mtns., 2 males, paratypes

Mycomyia tantilla(Loew),1869.

1869. Sciophila tantilla Loew, Berl. Ent. Zeit. 13:140, male? ----- NEBRASKA?, D.C.?

1905. Sciophila tantilla, Aldrich, Smiths. Misc. Coll. 46:141 ----- catalogue; D.C.

1909. Mycomya tantilla, Johannsen, Genera Insectorum 93:50 ----- new combination; eastern U.S.

1910. Mycomya tantilla, Johannsen, Maine Agric. Exp. Sta. Bull. 180: 166(key to males); 168(key to females); 175, male and female; fig.105 (wing); figs.140,143(male terminalia) ----- SOUTH DAKOTA, WYOMING, WISCONSIN, NEBRASKA.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:392(key to males).

1939. Fisher. Trans. Amer. Ent. Soc. 65:228 ----- COSTA RICA.

1952. Mycomya tantilla, Shaw and Fisher, Connecticut Geol. and Nat Hist. Surv. Bull. No.80:191 ----- MAINE.

There is some difference in the form of the male terminalia of the Saskatchewan and New Mexico specimens from those of other areas and from each other. Most of these differences are found in the degree of development of the dististyle and its process. The specimen from New Mexico is intermediate in form between specimens of tantilla from other areas and kiamichii.

The large number of specimens of both tantilla and kiamichii from Iowa, taken at the same time and in the same area, show little variation and no intermediates. This fact seems to indicate that the New

Mexico form is a distinct species. A study of the specimen of tantilla reported by Fisher (1939) from Costa Rica would help to establish the status of the New Mexican species by indicating the amount of variation in the species over a wide geographic range. Unfortunately, I have not been able to locate that specimen.

There seems to be some doubt as to the correct type locality for tantilla. In literature it is cited as D.C., however, I have seen a specimen at the Museum of Comparative Zoology(Harvard University) which is labelled type(1219), the locality "Nebr." No other Loew specimens are available if there are nay. Aldrich (1905) and Johannsen (1909), gave "D.C." and "Eastern United States" as the locality, probably having taken this from Loew's (1869) paper. Then, in 1910, Johannsen made no mention of any eastern records for the species and said "Recorded also from Nebraska." For the present, the locality given on the label of the type specimen is accepted, particularly because it agrees so well with knowledge of the distribution of this species.

This species gives the name to the Neotropical tantilla group and is closely related to the Neotropical cleta and the Nearctic kiamichii.

Mycomyia kiamichii Shaw,1940).

1940. Shaw, Can. Ent. 72:50, 1 male; fig.4(male terminalia ----- OKLAHOMA.

I have seen the terminalia of the type of this species. My specimens agree with the type terminalia which are on a slide in the collection of Dr. F.R. Shaw. This species is closely related to tantilla.

Iowa: 3 mi. S.E. of Holly Springs, June 12,1949, Slater and Laffoon, 14 males

Mycomyia hirticollis(Say),1824.

1824. Sciophila hirticollis Say, App. Long's Exped. St. Peter's River 2:362 ----- N.W. TERRITORY.

1828. Sciophila hirticollis, Wiedemann, Aussereur. zweiflug. Ins. 1:64 ---- N.W. PENNSYLVANIA.

1869. Sciophila appendiculata Loew, Berl. Ent. Zeit. 13:139, male (MCZ-1221) ----- NEW YORK. New synonymy.

1909. Mycomya appendiculata, Johannsen, Genera Insectorum 93:46 ----- new combination.

1909. Mycomya hirticollis, Johannsen, Genera Insectorum 93:48 ----- new combination.

1910. Mycomya hirticollis, Johannsen, Maine Agric. Exp. Sta. Bull. 180:167-8(key to males); 169-70(key to females; 181.

1910. Mycomya appendiculata, Johannsen, Maine Agric. Exp. Sta. Bull. 180:168(key to males); 181 ----- NEW YORK.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:392(key to males); 393, Pl.30, fig.13(lateral view, male terminalia); Pl.30,fig.14(dorsal view, male terminalia) ----- NOVA SCOTIA.

1937. Mycomyia appendiculata, Fisher, Jour. N.Y. Ent. Soc. 45:391 (key to males).

1952. Mycomya hirticollis, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:190(key to species) ----- NEW HAMPSHIRE.

1952. Mycomya appendiculata, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:189(key to species); 190 ----- NEW YORK.

Fisher's (1937) concept of this species is followed in order to avoid unnecessary confusion in the group. I have seen the type(1221) of M. appendiculata(Lw.) at the Museum of Comparative Zoology(Harvard University). It is a male of hirticollis and is synonymized here for the first time.

The inner style of the male terminalia is figured for comparison with that of hirticauda

Tennessee: GSMNP, Gatlinburg, 1500', July 5,1947, 2N, Mixed Mesophil, R.H. Whittaker, 1 male

New Jersey: Brookside, Mor Co., July, 1 male

New York: Ithaca, Nov.4,1933, F.R. Shaw, 4 males
Colden, Aug.2,1914, M.C. Van Duzee, 1 male
Bear Mt., Sept.26,1919, A.L. Melander, 1 male
holotype, appendiculata

Massachusetts: Amherst, Aug.29,1951, E.I. Coher, 1 male
Mt. Everett, July 24,1948, " 1 male
Dover, May 12,1903, 1 male

New Hampshire: Twinway, Zealand Mt., White Mtns., Sept.1,1951, O.S. Flint, 3 males
Galehead Tr., White Mtns., 2000', Aug.31,1951, O.S. Flint, 1 male
King's Rav., White Mtns., 2000', Sept.12,1940, F.E. Smith, 1 male
King's Rav., White Mtns., 3000', Sept.12,1940, F.E. Smith, 2 males
King's Rav., White Mtns., Aug.26,1935, C.P. Alexander, 1 male

Tuckerman Rav. Tr., White Mtns., 3600', Sept.10,1940, F.E. Smith,
1 male
" Rav. Tr., " " 2100' " 4 " J.F. Hanson,
1 male
" Rav. Tr., " " 2500' " " " "
1 male
" Rav. Tr., " " 2750' " " " "
1 male
Huntington Rav. Tr., " " 3600' " " " V. LaFleur,
1 male
" Rav. Tr., " " 5000' " " " "
1 male
Ammonoosuc Rav., White Mtns., 2700', Sept.5,1940, J.F. Hanson,
3 males
" Rav., " " " " " " M. Hanson, 1 male
" " " " 3000' " 12 " V. LaFleur,
1 male
Dolly Copp Camp, " " 1400' " 4 " J.F. Hanson,
1 male
Gorham, Aug.12,1 male

Vermont: S. Newfane, July, Bryant, 1 male

Nova Scotia: Digby, Aug.21,1943, 1 male

Quebec: Cape Bon Ami, Gaspe, Aug.19,1936, E.G. Fisher, 6 males
" " 13,1937, C.P. Alexander, 2 males

Montana: Glacier Nat. Pk., Avalanche Lk., 3900', Aug.26,1947, C.P. Alexander, 1 male

Alberta: Edmonton, Aug.18,1936, E.H. Strickland, 2 males

British Columbia: Robson, July 30,1947, H.R. Foxlee, 3 males
" Aug.9,1949 " 1 male
" Sept.3, " " 2 males

Washington: Mt. Rainier, Eagle Peak, Aug.25,1921, A.L. Melander, 2 males
" " Longmire, " 26 " " 1 male
" " Nisqually Glac., 4000', July 27,1947, C.P. Alexander, 2 males

Mt. Rainier, Wonderland Tr., 5500', Aug.1,1947, C.P. Alexander,
1 male
Mt. Baker, Silver Fir Camp, 1800', Aug.13, " "
1 male
" " Bagley Crk. " 2500' " " " "
1 male
Olympic Nat. Pk., Boulder Lk. Tr., 2300', Aug.5,1947, C.P.
Alexander, 1 male
" " Pk., Boulder Lk. Tr., 3500', " " " C.P.
Alexander, 1 male
" " Hot Springs, 5500', Aug.7,1947, C.P. Alexander,
1 male

Oregon: Wallowa Mtns., Lostine Valley, Aug.18,1948, C.P. Alexander,
1 male

Mycomyia hirticauda Van Duzee,1928.

1928. Van Duzee, Proc. Calif. Acad. Sci. 17:38, 2 males, 5 females, fig.3(male terminalia) ----- CALIFORNIA.

Through the courtesy of Dr. E.L. Kessel of the California Academy of Sciences, I have been able to see the entire type series of this species. The species is closely related to hirticollis and I can distinguish only the males with certainty. by a single character of the terminalia. The inner style of hirticauda is excavated on the apical margin (fig.107) while the apical margin of hirticollis is smooth (fig.106).

The paratypes proved to be two males and four females rather than one male and five females as reported by Van Duzee. Unfortunately, the terminalia of one of the males was lost by me during examination. One of the females is minus the abdomen. The holotype is registered as no.2489 and the allotype no.2490.

Oregon: Hood River, June 30,1917, A.L. Melander
Rogue R.N.F., Beaver Sulfur Camp, 1750', Aug.9,1950, C.P. Alexander, 1

Washington: Lilliwaup, July 23, 1917, A.L. Melander, 1
Lake Chelan, Lucerne, July 29,1917, A.L. Melander, 2
Mt. Rainier, Longmire Sprgs., 2800', July 23,1947, C.P. Alexander, 1

Mycomyia littoralis(Say),1824.

1824. Sciophila littoralis Say, App. Long's Exped. St. Peter's River 2:361 ----- LAKE SUPERIOR.

1828. Sciophila litteralis, Wiedemann, Aussereur. Zweiflug. Ins. 1:64 N.W. PENNSYLVANIA; misspelling of specific name.

1909. Mycomya littoralis, Johannsen, Genera Insectorum 93:48 ----- new combination.

1910. Mycomya littoralis, Johannsen, Maine Agric. Expt. Sta. Bull. 180:166(key to males); 168(key to females); 170; fig.145(male terminalis) ----- NEW YORK, WISCONSIN.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:391(key to males).

1952. Mycomya littoralis, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:189(key to species) ----- MAINE, NEW HAMPSHIRE, VERMONT, MASSACHUSETTS, CONNECTICUT, NEW YORK.

Since Say reported that he took this species along the shore of Lake Superior it seems that Wiedemann's locality designation must be in error, since he merely repeated original observations.

I have several new species, which are not described at the present time, which are very close to littoralis. It is quite possible that published records of littoralis in reality refer to one of those species. The European species maura and flava are members of the littoralis complex.

Tennessee: GSMNP, Cove For., Gatlinburg, 3000', June 24,1947, R.H. Whittaker, 2
" Cove For. " 4400', " 28 " R.H. Whittaker, 3
" Hemlock For., " 4000', " 29 " R.H. Whittaker, 4
" Cove For., " 4400', July 12, " R.H. Whittaker, 2
" Cove For., " " " 21 " R.H. Whittaker, 1

Virginia: Shenandoah, Big Meadows, July 5,1939, A.L. Melander, 2

New Jersey: Brookside, Mor Co., July, 2

Pennsylvania: North Mtn., Sept.1, 2
Hazleton, Luzerne Co., July 29,1912, W.G. Dietz, 1
" " " Aug. 5 " " 1
" " " Sept.17,1914 " 1

New York: S. Wales, July 9,1911, M.C. Van Duzee, 1
Grand Isd., June 26, 1910, " 1
Inlet Brook, McLean Resvr., Aug.7,1925, 1
Woodworth's Lk., Aug.22,1910, C.P. Alexander, 1

Massachusetts: Holliston, Sept.19, Banks, 1
" " 21 " 1
Essex, Sept.25,1921, 1
Dedham, " 4, C.W. Johnson, 1

New Hampshire: Tuckerman's Rav. Tr., Mt. Wash., 2100', Sept.4,1940, J.F. Hanson, 2
Tuckerman's Rav. Tr., " " 2750' " " " J.F. Hanson, 2

Tuckerman's Rav. Tr., Mt. Wash., 3000', Sept.4,1940, M. Hanson, 1 male
Ammonoosuc " White Mtns., 2700', Sept.5,1940, V. LaFleur, 8 males
" " " " " " " " J.F. Hanson, 4 males
" " " " " " " " M. Hanson, 3 males
" " " " 3000' " " " J.F. Hanson, 5 males
" " " " " " " " M. Hanson, 2 males
Huntington " " " 3300' " 4 " J.F. Hanson, 1 male
" " " " " " " " M. Hanson, 1 male
" " " " 4300' " " " V. LaFleur, 1 male
" " " " 4700', Aug.4,1944, J.F. Hanson, 1 male
King's " " " Aug.26,1935, C.P. Alexander, 4 males
Osgood Ridge " " June 26, 1935(???), C.P. Alexander, 2 males
Snyder Brook, White Mtns., Aug.26,1935, C.P. Alexander, 1 male
Galehead Tr., " " 2000', Aug.31,1951, O.S. Flint, 1 male
" " " " 3000' " " " " 4 males
Cutler Rav., Mt. Washington, 3600', Sept.4,1940, V.A. Lafleur, 1 male
" " 1 male

Vermont: Downer St. For., Aug.1,1952, E.I. Coher, 1 male

Quebec: Laniel, Aug.11,1939, J.L. Hitchon, 1 male
Knowlton, Aug.2,1929, L.J. Milne, 1 male

Ontario: Kearney, July 29,1911, M.C. Van Duzee, 2 males
Norway Point, Lake of Bays, July 31,1919, J. McDunnough, 1 male

Ohio: Hocking Co., July 4,1949, R.R. Dreisbach, 1 male

Missouri: Kahoka, June 20,1951, R.C. Froeschner, 2 males

Iowa: Ledges St. Pk., Boone Co., June 25,1950, J. Laffoon, 1 male

Wisconsin: 1 male
Brule Riv., Doug Co., Aug.23,1912, W. Stone, 1 male

Minnesota: Lake Itasca, Clearwater Co., Sept.1,1950, J. Laffoon, 1 male
" " " " " 2 " " 1 male
" " " " " 3 " " 1 male
Itasca St. Pk., Sept.2,1950, J. Laffoon, 2 males

Mycomyia sublittoralis Shaw, 1941.

1941. Shaw, Amer. Mid. Nat. 26:172, 1 male; figs. 8,9 (male terminalia)
---- NORTH CAROLINA.

The type terminalia of this species cannot be located at present. There is little doubt, however, as to the identity of the species. I have seen a specimen determined by Shaw as well as the remainder of the type. It is closely related to littoralis.

Tennessee: GSMNP, Green Briar Cove, Mount trail, June 12,1946, R.R. Dreisbach, 1 male
" Hemlock For., Gatlinburg, 4000', July 13,1947, R.H. Whittaker, 1 male
" Cove For., Gatlinburg, 3000', July 20,1947, R.H. Whittaker, 1 male

Virginia: Shenandoah Big Meadows, July 3,1939, A.L. Melander, 1 male

West Virginia: Lost River St. Pk., Hardy Co., July 30,1940, A. Stone, 1 male

New York: Colden, July 9, 1922, M.C. Van Duzee, 1 male

Massachusetts: Lake May, East Lee, Aug.2,1930, C.P. Alexander, 1 male

Vermont: Downer St. For., Aug.15,1952, E.I. Coher, 1 male

Ontario: Kearney, Aug.1,1911, M.C. Van Duzee, 1 male

Minnesota: Lake Itasca, Clearwater Co., Sept.1,1950, J. Laffoon, 2 males
" " " " " 2 " " 9 males
" " " " " 3 " " 2 males
Itasca St. Pk., Sept.2,1950, J. Laffoon, 8 males

Montana: Lake McDonald, Glacier Pk., Aug.14,1916, A.L. Melander, 1 male

Alberta: Waterton Ntl. Pk., July 24,1946, G.F. Knowlton, 1 male

Washington: Mt. Baker, Bagley Cr. Camp, 2500', Aug.13,1947, C.P. Alexander, 1 male

Mycomyia frequens Johannsen,1910.

1910. Mycomya littoralis var. frequens, Johannsen, Maine Agric. Exp. Sta. Bull. 180:165(key to males); 168(key to females); fig.144(male terminalia); 171 ----- CALIFORNIA.

I have seen the specimens labelled holotype and allotype in the Cornell University collection. They are both females. Dr. Johannsen has been apprised of this fact, and when so-called paratypes in my possession are returned to the collection he will designate a male specimen properly as the holotype. I have also seen co-types from the American Museum of Natural History collection.

This variety has been raised to specific rank where it undoubtedly belongs. It is one of the species of the littoralis complex and has other species, not described, which are closely related to it.

California: Berkeley Hills, Alameda Co., March 22,1908, ?Cresson, 2 males
" " " " April 20,1908, 3 males
Yosemite, June 10,1935, A.L. Melander, 1 male

Mycomyia dentata Fisher,1937.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:391(key to males; 396, 1 male; fig.10(male terminalia) ----- NEW HAMPSHIRE.
1952. Mycomya dentata, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:189(key to species); 190 ----- NEW HAMPSHIRE.

I have seen the type(1416) of this species at Cornell University. I have also seen a specimen labelled paratopotype, however, the original paper states that the species was described from a type, therefore the designation of the paratype cannot stand. This species is one of the closely allied species of the littoralis complex.

North Carolina - Tennessee: Smoky Mtns., Newfound Gap, 5000-5200', Sept.1,1930, N. Banks, 1 male

Pennsylvania: North Mt., Sept.1, 1 male

New York: The Hook, McLean Res., Aug.19,1925, 6 males
West Ridge, " " " 7 " 1 male
" " " " " 17 " 1 male
Inlet Brook " " " 7 " 1 male
S.E. Slope " " " 12 " 1 male
Reserve, " Bogs, " 7 " 1 male

Massachusetts: Mt. Everett, July 24,1948, E.I. Coher, 1 male

New Hampshire: King's Rav., White Mtns., Aug.26,1935, C.P. Alexander, 1 male
King's Rav., " " June(?) " " 1 male
King's Rav., " " Aug.26, " " 2 males
King's Rav. Tr., White Mtns., 1700', Sept.6,1940, M. Hanson, 1 male

King's Rav. Tr., White Mtns., 1800', Sept.6,1940, M. Hanson, 1 male
Osgood Ridge, " " June(?) 26,1935, C.P. Alexander, 1 male
Pinkham Notch, Crystal Cascades, White Mtns., 2100', Aug.4,1944, J.F. Hanson, 1 male
White Mtns., Morrison, 1 male

Vermont: Downer St. For., Aug.8,1952, E.I. Coher, 1 male
" " " " 15 " " 1 male

Ontario: Norway Point, Lake of Bays, July 31,1919, J. McDunnough, 3 males
" " " " " Aug. 1 " " 2 males

Wisconsin: Price Co., Aug.13,1897, W.M. Wheeler, 1 male

Minnesota: Lake Itasca, Clearwater Co., Sept.1,1950, J. Laffoon, 1 male
" " " " " 3 " " 3 males
Itasca St. Pk., Sept.2,1950, J. Laffoon, 1 male

Mycomyia sphagnicola Shaw,1941.

1941. Shaw, Amer. Mid. Nat. 26:171, 1 male; fig.5(male terminalia) ---- NORTH CAROLINA.

I have not seen the type terminalia of this species since it cannot be located. It appears to be easily recognizable by the figure of the terminalia which differs only very slightly from the figure of the terminalia of intermedia Fisher.

New York: The Shack, McLean Res., June 2,1924, 1 male
McLean, Tompkins Co., May 31,1913, 1 male
Sport Island, Sacandaga R., June 4,1914, C.P. Alexander, 1 male
Avalanche Lk., Adirondacks, July 4,1938, C.P. Alexander, 1 male

Newfoundland: Codroy Valley, July-Aug., A. English, 1 male

British Columbia: St. Mary's, July 12,1926, A.A. Dennys, 1 male

Oregon: Blue Mtns., Spring Crk., 3900', June 24,1948, C.P. Alexander, 1 male

Mycomyia fragilis (Loew),1869. n. comb.

1869. Polylepta fragilis Loew, Berlin. Ent. Zeitschr. 13:138, male ----- ALABAMA (?)

1909. Polylepta fragilis, Johannsen, Genera Insectorum, Fasc. 93:43 ----- suggested that this species was "Perhaps Mycomya."

1910. Polylepta fragilis, Johannsen, Maine Agric. Exp. St. Bull. 180: 146(key); 147, female ----- MASSACHUSETTS (?)

1952. Polylepta fragilis, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:193(key to species).

This species which has been recognized by other workers in the group besides myself as a Mycomyia with spurs, is recognized and figured(figs.108 and 109) for the first time. Johannsen (1909) suggested the correct position of the species and I am indebted to him for the clue that prompted me to examine the type. Both Fisher and Laffoon, the former through unpublished notes and the latter through a personal communication also pointed out the synonymy for which information I am grateful. The type(1224) is deposited at the Museum of Comparative Zoology(Harvard University); the locality label reads "Ala."

This species may be synonymous with the European trivittata Zett.,1838.

Virginia: Arlington, Apr.1946, K.L. Knight, 1 male

Maryland: Plummer's Isl., Apr.5,1914, R.C. Shannon, 1 male
" " " 12 " " 1 male
" " " 19 " " 1 male at spring
Cabin John Bridge, Apr.23,1914, " 1 male

Pennsylvania: Hazleton, July 14,1910, Dietz, 1 male
" June 28,1912, " 1 male

Connecticut: Beacon Falls, Sept.12,1933, C.P. Alexander, 1 male

Massachusetts: Cranberry Pond, Sunderland, Oct.15,1950, E.I. Coher, 2 males
Dover, May 12,1903, 1 male
Montague, May 14,1951, T.H. Farr, 1 male
Belchertown, Sept.25,1930, F.R. Shaw, 1 male

New Hampshire: King's Rav., Mt. Adams, 2500', Oct.12,1940, F.E. Smith, 1 male
King's Rav., " " 3000' " " " " 1 male
King's Rav. Tr., White Mtns., 2000', Oct.12,1940, J.F. Hanson, 1 male
King's Rav. Tr., " " 2500' " " " J.F. Hanson, 1 male
Snyder Brk., " " Aug.2,1935, C.P. Alexander, 1 male
Huntington Rav. Bowl, Mt. Wash., Sept.4,1940, 4300', J.F. Hanson, 1 male

Minnesota: Itasca St. Pk., Sept.2,1950, J.F. Hanson, 1 male

<u>Mycomyia</u> <u>brevivitta</u>(Coq.),1905.

1905. <u>Sciophila</u> <u>brevivitta</u> Coq., Jour. N.Y. Ent. Soc. 13:67, 3 males BRITISH COLUMBIA.

1909. <u>Mycomya</u> <u>brevivittata</u>, Johannsen, Genera Insectorum 93:46 ----- new combination; misspelling of specific name.

1910. <u>Mycomya</u> <u>brevivittata</u>, Johannsen, Maine Agric. Exp. Sta. Bull. 180:176, male; fig.134(male terminalia) ----- NEW YORK, WISCONSIN, ILLINOIS.

1917. <u>Mycomya</u> <u>brevivittata</u>, Malloch, Bull. Ill. St. Lab. Nat. Hist. 12:257(larva, pupa); Pl.37, fig.17(mandible of larva), fig.18(pupa, lateral); Pl.38, fig.1(pupa, ventral), fig.4(head of larva, ventral) ----- ILLINOIS.

1937. <u>Mycomyia</u> <u>brevivittata</u>, Fisher, Jour. N.Y. Ent. Soc. 45:391 (key to males).

1952. <u>Mycomya</u> <u>brevivittata</u>, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:189(key to species); 190 ----- NEW YORK.

I have not seen the type(8380) at the U.S. National Museum. My specimens vary very slightly in the form of the tergal style. The variation does not seem to be significant along distributional patterns.

Massachusetts: Belchertown, Sept.18,1930, F. Shaw, 1 male
Amherst, Aug.31,1951, E.I. Coher, 5 males
Pittsfield, Camp Merrill, June 27,1948, E.I. Coher, 1 male

New Hampshire: Lion's Head Tr., White Mtns., 3800', July 30,1944, J.F. Hanson, 1 male

Vermont: Groton St. Pk., July 31,1952, E.I. Coher, 1 male
Sand Bar St. Pk., July 30,1952, E.I. Coher, 1 male

Quebec: La Trappe, July 17,1943, J. Ouellet, 1 male

Michigan: Douglas Lk., July 7,1949, W. Porter, 1 male

Mycomyia alternata Fisher,1937.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:391(key to males); 396, 1 male; fig.5(male terminalia) ------ NEW YORK.

1952. Mycomya alternata, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:189(key to males); 190 ------ NEW YORK.

This species varies quite widely in the length of the outer and inner sternal processes and the inner style of the sternal portion of the terminalia. The variations do not appear to follow any geographical distribution. There is no evidence of subspeciation. No long series from any one locality is available for study, therefore it is not known whether some of the forms listed below represent specific populations.

The type(1413) is in the Cornell University collection.

Tennessee: Smoky Mtns., 5000', June 13,1939, C.P. Alexander, 1 male
(Mt. Leconte)
" Mtns., 5500', " 9 " " 1 male

North Carolina - Tennessee: Smoky Mtns., Newfound Gap, 5000'-5200', Sept.2,1930, N. Banks, 1 male

North Carolina: Smoky Mtns., Bryson City, Deep Crk., 2000', Aug.23, 1930, N. Banks, 1 male

Maryland: Beaverdam Run, Baltimore Co., July 21,1940, E.G. Fisher,
1 male

Pennsylvania: Laurelton, Aug.4, N. Banks, 1 male
Spring Brk., June 13,1945, 1 male (DDT Expt.)

New York: Oneonta, Swamp, 1900', Aug.18,1935, H.K. Townes, 1 male

Massachusetts: Amherst, Aug.31,1951, E.I. Coher, 1 male

New Hampshire: Lion's Head Tr., White Mtns., 3800', July 30,1944,
J.F. Hanson, 1 male

Maine: Mt. Katahdin, 3000', July 28,1951, O.S. Flint, 1 male

Iowa: Ledges St. Pk., Boone Co., Sept.6,1950, J. Laffoon, 1 male
" " " July 10,1947, " 1 male

Wyoming: Yellowstone N.P., Emerald Pool, 7400', July 12,1942, C.P.
Alexander, 1 male
Yellowstone N.P., N.E. Entrance, June 26,1941, C.P. Alexander,
1 male

British Columbia: Robson, June 22,1947, H.R. Foxlee, 1 male

Washington: Mt. Baker, Upper Razorback Crk., 6500', July 12,1948, C.P.
Alexander, 2 males
Mt. Baker, Baker L., 6500', July 15,1948, C.P. Alexander
1 male
Olympic N.P., Hot Springs, 2500', July 19,1948, C.P.
Alexander, 1 male

Mycomyia nugatoria Johannsen,1910.

1910. *Mycomya nugatoria* Johannsen, Maine Agric. Exp. Sta. Bull. 180: 169(key to females); 183, 2 females ----- NORTH CAROLINA(holotype); WISCONSIN.

The paratype(20534) in the American Museum of Natural History collection is actually a male in fair condition, not a female as indicated by Johannsen. Unfortunately, while preparing the terminalia for study, I lost them, not, however, before the species was known to me. Since this material arrived too late to include a figure of the male terminalia of the species, a few of the outstanding characters of the terminalia are discussed. This species shows a closer affinity with Neotropical forms than with any other Nearctic or Holarctic species known to me. It is in particular, close to the species of the manteri group (Group A of Coher,1950). The tergal portion of the terminalia are unique in the fan-like appearance of the spatulate and ensiform setae at the apex of the tergal style.

Although the terminalia are lost, the specimen from the type series is here designated the allotype and is so labelled.

Massachusetts: Belchertown, Oct.2,1930, F.R. Shaw, 1 male

Quebec: Mt. Orford, Sept.9,1937, G.E. Shewell, 1 male

Iowa: Ledges St. Pk., June 25,1941, J. Laffoon, 1 male
Lacey-Keosauqua St. Pk., Van Buren Co., Sept.10,1949, J. Laffoon and J. Slater, 1 male.

Mycomyia triacantha Shaw,1941.

1941. Shaw, Amer. Mid. Nat. 26:172, 1 male; figs.6,7(male terminalia) ----- NORTH CAROLINA.

The type terminalia cannot be located. I have seen the remainder.

The species seems to be easily separated from all others on the form of the terminalia. One specimen is topotypic although taken at 5000' whereas the type was taken at 5500'.

Tennessee: Great Smoky Mtns., LeConte Tr., May 25,1946, J.F. Hanson,
1 male $\frac{1}{2}$m.1st.stream

North Carolina: Mt. Mitchell, 5000', May 29,1946, J.F. Hanson, 1 male

New Hampshire: King's Rav. Tr., White Mtns., 2100', Oct.12,1940, E.W. King, 1 male
King's Rav. Tr., " " 3500' " " " J.F. Hanson, 1 male
King's Rav. Tr., " " 1800' " " " F.E. Smith, 1 male
King's Rav. Tr., " " " " " " F.E. Smith, 1 male
King's Rav. Tr., " " " " " " F.E. Smith, 1 male
Ammonoosuc Rav., " " 3000' " " " J.F. Hanson, 1 male
Dolly Copp Camp, " " 1400', Sept.4, " J.F. Hanson, 1 male
Tuckerman's Rav. Tr., Mt. Wash., 2750', Oct.10,1940, J.F. Hanson, 1 male

Mycomyia scopula Fisher,1937.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:392(key to males); 394, 1 male; figs.20,21(male terminalia) ------ NEW YORK.

1952. Mycomya scopula, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:190(key to species) ------ NEW YORK.

I have seen the type(1409) in the Cornell University collection. My specimens agree with it.

New York: Beaverkill, Aug.4,1916, 1 male

Vermont: Dowmer St. For., June 23,1952, E.I. Coher, 1 male

Quebec: Cape Bon Ami, Gaspe, Aug.19,1936, ?E.G. Fisher, 1 male

Mycomyia parascopula Fisher,1937.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:392(key to males); 394, 1 male; fig.22(male terminalia) ----- MARYLAND.

I have seen the type(1410) in the Cornell University collection. My specimens agree with it.

Maryland: Beaverdam Run, Baltimore Co., July 7,1940, E.G. Fisher, 1 male

Iowa: Ledges St. Pk., June 25,1949, J. Laffoon, 1 male

Mycomyia flavohirta(Coq.),1901.

1901. Sciophila flavohirta Coq., Proc. U.S. Nat. Mus. 23:596, 1 male ----- NEW HAMPSHIRE.

1905. Sciophila flavohirta, Aldrich, Smiths. Misc. Coll. 46:140 ----- catalogue, NEW HAMPSHIRE.

1909. Mycomya flavohirta, Johannsen, Genera Insectorum 93:47 ----- new combination.

1910. Mycomya flavohirta, Johannsen, Maine Agric. Exp. Sta. Bull. 180: 168(key to males) ----- NEW HAMPSHIRE.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:392(key to males).

1943. Neoempheria flavohirta, Fisher, Ent. News. 54:149, 2 males, 4 females; figs.1,2(male terminalia) ------ reexamined type, new combination, NEW HAMPSHIRE, BRITISH COLUMBIA, WASHINGTON.

1952. Mycomya flavohirta, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:190(key to species) ------ NEW HAMPSHIRE, CONNECTICUT.

I have seen the type(5445) at the U.S. National Museum and my specimens agree with it. The 1952 paper by Shaw and Fisher was in press for many years and I am uncertain whether the reversal of opinion on the position of this species was intentional. However, the latest observation (1952) concurs with my own and I feel that the form of the terminalia is that of a Mycomyia rather than that of a Neoempheria. The published distribution records for the species are compatible with those found in this study, however, records based on identification of female specimens (British Columbia) must be viewed with suspicion.

Ontario: Lake Abitibi, Low Bush, Aug.4,1925, N.K. Bigelow, 1 male
" " " " " 8 " " 2 males

British Columbia: Midday Val., Merritt, July 26,1923, R. Hopping, 1 male, Pinus ponderosa

Mycomyia sigma Johannsen,1910.

1910. Mycomya sigma Johannsen, Maine Agric. Exp. Sta. Bull. 180: 167(key to males); 180, male; fig.138(male terminalia) ------ NORTH CAROLINA.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:392(key to males); 393 ------ NEW YORK.

1952. Mycomya sigma, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:190(key to species) ----- NEW YORK.

Through the courtesy of Dr. C.H. Curran of the American Museum of Natural History, I have been able to see the type(20535) of this species. The terminalia cannot be located. In addition to characters cited for this species, it should be noted that M_{1+2} is bare and that Sc, M_1, M_2, M_4, Cu and Cu_1 are setose. Mesococxal spurs are present and are long and saber-like. The tips are hidden between the fore-coxae. The apices of the spur of a specimen from Idaho shows a black recurved point, which is not so dark on the Wyoming specimen.

My specimens differ in some slight detail of the tergal portion from Johannsen's drawing but are almost undoubtedly the same species.

Massachusetts: Montague, June 6,1951, E.I. Coher, 1 male

Idaho: Lake Waha, June 9,1918, A.L. Melander, 1 male

Wyoming: Grand Tetons, Hidden Falls, 6900', July 8,1942, C.P. Alexander, 1 male

Mycomyia maxima Johannsen,1910.

1910. Mycomya maxima Johannsen, Maine Agric. Exp. Sta. Bull. 180; 167(key to males); 168(key to females); 179, 1 male, 1 female; 188(female); fig.157(male terminalia) ------ LABRADOR(male holotype);

MAINE. Type locality in error as Maine, actually Nain, Labrador.

1925. Mycomya maxima, Johnson, Occ. Papers Boston Soc. Nat. Hist. 7:81 ----- correction of type locality.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:392(key to males).

1952. Mycomya maxima, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:190(key to species) ----- MAINE, NEW HAMPSHIRE, VERMONT, MASSACHUSETTS, NEW YORK.

The type of this species in itself has a rather remarkable distribution. The terminalia are in the Cornell University collection with the type number 264. The remainder of the type is in the Museum of Comparative Zoology (Harvard University) collection with the type number 7443. This is a rather extreme case of the kind of difficulty encountered in a study of this group.

I have seen the type. The terminalia have a very narrow median tergal style which serves to distinguish the species.

Alberta: Banff N.P., Moraine L., 6100', July 19,1949, C.P. Alexander, 1 male

Oregon: Mt. Hood, Sahalie Falls, July 17,1947, C.P. Alexander, 1 male

Mycomyia terminata Garrett,1924.

1924. Mycomya terminata Garrett, Insec. Insc. Mens. 12:60, 8 males, probably 5 females ----- BRITISH COLUMBIA.

This species is closely related to fulvitibia Van Duzee and dichaeta Fisher. I have recognized this species by examination of two metatypes and a specimen determined by Garrett. From a key to Garrett's species on loan from Dr. Fisher and some figures of terminata made by Garrett, I would not be able to recognize the species. There is a slight amount of variation in the development of the outer style, which is caused by the depth of emargination between the apical spurs. The aedeagi of all specimens correspond quite closely (figs.110 and 111).

British Columbia: Kimberley, St. Mary's Lk., Aug.29, C.B. Garrett, 2 males
Cranbrook, May 27, C.B. D. Garrett, 1 male
Cultus, Oct.21,1938, J.K. Jacob, 1 male

Oregon: Blue Mtns., Pine Crk., 4600', June 25,1948, C.P. Alexander, 1 male
Rogue R.N.F., Beaver Sulfur Camp, 1750', Aug.9,1950, C.P. Alexander, 1 male

Mycomyia fulvitibia VanDuzee,1928.

1928. VanDuzee, Proc. Calif. Acad. Sci. 17:38, 3 males, 2 females; fig.4(male terminalia) ------ CALIFORNIA.

1928. Mycomyia longispina VanDuzee, Proc. Calif. Acad. Sci. 17:41, 9 males, 4 females; fig.8(male terminalia) ------ CALIFORNIA. New synonymy.

I have seen the types of fulvitibia and longispina and I find that they are the same species. They are synonymized here for the first time. A male paratype of fulvitibia has the abdomen missing.

A paratype female and a paratype male of longispina also have the abdomen missing.

The holotype(2489) and allotype(2490) of fulvitibia as well as the holotype(2494) and allotype(2495) of longispina were examined through the courtesy of Dr. E.L. Kessel of the California Academy of Sciences.

This species is most closely related to terminata Garrett and may be told from that species by the form of the male terminalia, particularly the inner style and the aedeagus (figs.112 and 113).

California:	Mill Valley, Marin Co., March 13,1926,	Van Duzee,	1 male
	" " " " Apr. 15, "	"	1 male
	" " " " " 9, "	"	1 male
	Redwood Canon, " " May 17, 1908,	"	1 male
	Hatchet Pass, Burney, July 9, 1941, 4000',	"	1 male

Mycomyia dichaeta Fisher,1937.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:391(key to males); 394, 3? males; figs.7,9(male terminalia) ----- NEW YORK.

1952. Mycomya dichaeta, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:189(key to species); 190 ----- NEW YORK.

I have seen the type and paratypes of this species at Cornell University(1415). It is closely related to some of the Garrett species, particularly terminata and also to fulvitibia Van Duzee. The European species brunnea is also a member of this complex. The aedeagus is figured in detail (figs.114 and 115).

Massachusetts: Amherst, July 4,1951, light trap, E.I. Coher, 1 male
" " 24, " " " " 1 male
Holliston, Aug. 1 male

New Hampshire: Northfield, Apr.20,1952, T.H. Farr, 3 males

Delaware: Odessa, May 31,1937, light trap, G.H. Bradley, 1 male

Maryland: Plummer's Id., Apr.19,1914, R.C. Shannon, 1 male

Iowa: Lacey-Keosauqua St. Pk., Van Buren Co., Sept.9,1949, J.L. and J. Slater, 1 male
Lacey- Keosauqua St. Pk., " " " " 10 " J.L. and J. Slater, 4 male
Ledges St. Pk., Boone Co., June 21,1950, J. Laffoon, 1 male
" " " " " July 29, " " 1 male
" " " " " Sept.25, " " 2 males
" " " " " " 29,1949 " 1 male
" " " " " Oct. 11,1950 " 1 male
Palisades-Kepler St. Pk., Linn Co., July 8,1950, J.L. Slater and Hicks, 1 male

Mycomyia curvata Fisher,1937.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:392(key to males); 395, 6 males; figs.12,17(male terminalia) ----- ALBERTA; MAINE.

1952. Mycomya curvata, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No80;190(key to species).

I have seen the type(1414) in the Cornell University collection. It could not be studied since the alcohol in the vial in which it had been placed had evaporated, leaving the type firmly adhering to the bottom of the vial.

Examination of the paratypes showed the following: four adults are preserved in alcohol in a single vial. Only one of these has the terminalia attached. Two other terminalia are also present but cannot be correlated with any of three adults lacking terminalia.

Fisher's figure shows the median tergal process to be convex apically. Two paratypes, however, show a truncate process as do all specimens, but one, which have been studied. A single specimen from the Northwest Territory has the apex of the tergal process like that of the figure but with a less convex apex. It is interesting to speculate that the third of Fisher's paratypes, which is like her figure, is the Maine specimen. That is, she might have used this specimen for her illustration but chosen a specimen from the Alberta series as the type. Although known distribution of this species seems to exclude the Maine specimen from the species, I am not yet prepared to say that it is not conspecific with the Alberta specimens. Perhaps the Maine and Marthwest Territory specimens represent a separate species. Examination of the type should help to solve this problem of speciation.

I am indebted to Dr. J.A.G. Rehn for the loan of the paratype material from the Philadelphia Academy of Sciences.

Wyoming: Snowy Range Mtns., Albany Co., Sept.25,1947, D.G. Denning, 1 male

Montana: Glacier N.P., Logan Pass, 6900', Aug.21,1949, C.P. Alexander, 1 male

Alberta: Banff N.P., Moraine L., 5000', Aug.23,1947, C.P. Alexander, 5 males

Jasper N.P., Edith Cavell, 5800', Aug.21,1947, C.P. Alexander, 2 males

British Columbia: Revelstoke N.P., 4375', Aug.17,1947, C.P. Alexander,
1 male

Washington: Olympic N.P., Deer Park, 5400', Aug.6,1947, C.P. Alexander,
1 male

Northwest Territory: Bear River, Buffalo Pk., Sept.12,1926, J. Russell

Mycomyia calcarata(Coquillet),1905.

1905. Sciophila calcarata Coquillet, Invert. Pacifica 1:19, 10 males ----- CALIFORNIA.

1909. Mycomya calcarata, Johannsen, Genera Insectorum 93:46 ----- new combination.

1910. Mycomya calcarata, Johannsen, Maine Agric. Exp. Sta. Bull. 180: 165(key to males); 178.

I have five males from the co-type series(7668) on loan through the courtesy of Dr. Alan Stone of the U. S. National Museum. One of the males is here designated as lectotype and is so labelled.

The species is closely related to the ornata-mendax group of species, however, for the present, I am considering it to be in a separate group. This species is somewhat different in the form of the tergal portion of the terminalia from the group represented by mendax. There is also some difference in the basic plan of the plan of the sternal portion of the terminalia. The terminalia are figured here for the first time (figs.116 and 117).

There are no further records of calcarata except for those of the types.

California: Stanford Univ., San Mateo Co., Baker, 5 males

Mycomyia mendax Johannsen,1910.

1910. Mycomya mendax Johannsen, Maine Agric. Exp. St. Bull. No.180: 182, 3 males, 1 female; figs.141,142(male terminalia) ----- IDAHO (holotype), CALIFORNIA, BRITISH COLUMBIA.

I have seen the type of this species. There are no further records.

Mycomyia marginalis Johannsen,1910.

1910. Mycomya marginalis Johannsen, Maine Agric. Exp. St. Bull. 180: 166,167(key to males); 177, 1 male; fig.135(male terminalia) ----- BRITISH COLUMBIA.

I have seen the type(266) in the Cornell University collection. My specimen agrees with the type.

Washington: Mt. Baker, Skyline Tr., Aug.10,1925, A.L. Melander, 1 male

Mycomyia nigrihirta Van Duzee,1928.

1928. Mycomya nigrihirta Van Duzee, Proc. Calif. Acad. Sci. 17:39, 1 male, 1 female; fig.5(male terminalia) ----- CALIFORNIA.

I have seen the holotype(2493) and a paratype through the courtesy of Dr. E.L. Kessel of the California Academy of Sciences. The paratype is probably the specimen originally designated by Van Duzee as the allotype. He is known to have incorrectly determined the sex of specimens in other groups of insects. The specimens are conspecific. The terminalia of this species is illustrated since Van Duzee's drawings are worthless (figs.118 and 119).

Oregon: State Line Crk., Aug.9,1948, C.P. Alexander, 1 male.

Mycomyia polleni Garrett,1924.

1924. Mycomya polleni Garrett, Insec. Insc. Mens. 12:65, 6 males ----- BRITISH COLUMBIA.

I have seen two conspecific paratypes of this species. The terminalia (figs.120 and 121) are illustrated for the first time. This species is most closely related to echinata Garrett. No further records of this species are known.

Mycomyia echinata Garrett,1924.

1924. Mycomya echinata Garrett, Insec. Insc. Mens. 12:161, 5 males, several females ----- BRITISH COLUMBIA.

1928. Mycomyia abbreviata Van Duzee, Proc. Colif. Acad. Sci. 17: 3 males, 11 females; fig.9(male terminalia) ----- CALIFORNIA. New synonymy.

The identity of echinata has been based on the examination of a single paratype and two metatypes which agree with each other in all characters. Through the courtesy of Dr. E.L. Kessel of the California Academy of Sciences, I have been able to see the entire type series of abbreviata. Van Duzee's species is conspecific with echinata. Besides the holotype of abbreviata, there were two male and ten female paratypes. The terminalia of a paratype from San Francisco is like the others, but the styles are narrower in proportion to the length than in other specimens. The synonymy is proposed here for the first time and the terminalia are illustrated (figs.122 and 123).

In the series studied, the outer sternal lobe of the terminalia which is so prominent in the California specimens, gradually flattens and is nearly gone in specimens from Utah, the other extreme of the presently known range of the species.

California: Prairie Crk.,St. Pk., July 31,1946, C.P. Alexander, 1 male

Oregon: Wallowa Mtns., Lostine Valley, Aug.19,1948, C.P. Alexander,
1 male

Washington: Mt. Rainier, Ohanapecosh Camp, 2900', July 28,1947,
1 male

British Columbia: St. Mary's Lk., Kimberley, July 1924, C.B.D. Garrett,
2 metatypes
Robson, July 30,1947, H.R. Foxlee, 1 male

Idaho: Twin Creek Camp, 5300', June 28,1949, 1 male

Montana: Glacier N.P., Many Glaciers, July 6,1949, C.P. Alexander, 1 male
Lookout Pass, Denna Mora Crk., Aug.14,1946, C.P. Alexander,
1 male

Utah: Dixie N.F., Duck Creek Camp, 8600', June 26,1947, C.P. Alexander, 1 male

<u>Mycomyia vulgaris</u> Garrett,1924.

1924. <u>Mycomya vulgaris</u> Garrett, Insec. Insc. Mens. 12:63, 131 males, 55 females ----- BRITISH COLUMBIA.

I have seen several male paratypes of this species, all of which are conspecific. The terminalia are here figured (figs.124 and 125) for the first time from the paratypes. Two topotypes determined by Garrett agree with the paratypes, however, a third topotype determined by him differs very noticeably in the form of the terminalia from the other specimens. It is very probable that <u>simplex</u>(Coq.) and perhaps <u>magna</u> Garrett are species in the <u>vulgaris</u> group, however, at present I cannot recognize those species. Five forms of terminalia close to that of <u>vulgaris</u> are represented in the material studied for this paper. It may be that the unrecognized forms are included in that collection. The European species <u>fasciata</u> is closely related to <u>vulgaris</u>.

Alberta: Banff, July 12,1922, C.B.D. Garrett, 7 males
" " 13, " " 9 "
" " 18, " " 1 male
Moraine Lk., Aug.4,1923, J. McDunnough, 1 male

British Columbia: Mt. McLean, Lillooet, 6000-7000', July 26,1933, J. McDunnough, 1 male

Mycomyia _turitella_ Fisher,1937.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:395, 1 male; figs.4,8(male terminalia) ----- FLORIDA.

I have seen the type(1408) of this species in the Cornell University collection. There are no further records of this species. It is closely related to _brevivitta_.

Mycomyia _pseudomaxima_ Fisher,1937.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:393, 1 male; fig.19(male terminalia) ----- NEW YORK.

I have seen the type(1411) of this species in the Cornell University collection. There are no further records of this species.

Mycomyia _intermedia_ Fisher,1937.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:396, 1 male; fig.23(male terminalia) ----- CALIFORNIA.

I have seen the type(1412) of this species in the Cornell University collection. There are no further records of this species. It is closely related to _sphagnicola_.

Mycomyia _nigra_ Fisher,1938.

1938. Fisher, Trans. Amer. Ent. Soc. 64:198, 1 male; figs.6,7(male terminalia) ----- MARYLAND.

I have seen all but the terminalia of the type(6545) of this species in the Philadelphia Academy of Natural Sciences collection. The terminalia cannot be located at present. There are no further records of this species.

Species Described by Garrett and Not Placed in This Study.

Mycomyia cranbrooki Garrett,1924.

1924. Mycomya cranbrooki Garrett, Insec. Snsc. Mens. 12:61, 1 male ----- BRITISH COLUMBIA.

Mycomyia caulfieldi Garrett,1924.

1924. Mycomya caulfieldi Garrett, Insec. Insc. Mens. 12:62, 1 male, 1 female ----- BRITISH COLUMBIA.

Mycomyia humidus Garrett,1924.

1924. Mycomya humidus Garrett, Insec. Insc. Mens. 12:62, 3 males, 3 females ----- BRITISH COLUMBIA(holotype); MONTANA.

Mycomyia magna Garrett,1924.

1924. Mycomya magna Garrett, Insec. Insc. Mens. 12:64, 11 males, 13 females ----- BRITISH COLUMBIA.

Mycomyia ampla Garrett,1924.

1924. Mycomya ampla Garrett, Insec. Insc. Mens. 12:64, 2 males, 1 female ----- ALBERTA(holotype), BRITISH COLUMBIA.

Mycomyia difficilis Garrett,1924.

1924. Mycomya difficilis Garrett, Insec. Insc. Mens. 12:65, 6 males, 1 female ----- BRITISH COLUMBIA.

Mycomyia shermani Garrett,1924.

1924. Mycomya shermani Garrett, Insec. Insc. Mens. 12:66, 2 males ----- BRITISH COLUMBIA.

Mycomyia atus Garrett,1924.

1924. Mycomya atus Garrett, Insec. Insc. Mens. 12:159, 3 males ----- BRITISH COLUMBIA.

Mycomyia autumnalis Garrett,1924.

1924. Mycomya autumnalis Garrett, Insec. Insc. Mens. 12:160, 1 male, 1 female ----- BRITISH COLUMBIA.

Mycomyia hamatus Garrett,1924.

1924. Mycomya hamatus Garrett, Insec. Insc. Mens. 12:160, 1 male ----- BRITISH COLUMBIA.

Mycomyia durus Garrett,1924.

1924. Mycomya durus Garrett, Insec. Insc. Mens. 12:162, 1 male ----- BRITISH COLUMBIA.

Mycomyia armata Garrett,1924.

1924. Mycomya armata Garrett, Insec. Insc. Mens. 12:163, 1 male ----- BRITISH COLUMBIA.

Species Originally Described From Males - Types Not Seen

Mycomyia nigricauda(Adams),1903.

1903. Sciophila nigricauda Adams, Kans. Sc. Quart. 2:23, 1 male ----- COLORADO.

1909. Mycomya nigricauda, Johannsen, Genera Insectorum 93:49 --- new combination.

1910. Mycomya nigricauda, Johannsen, Maine Agric. Exp. Sta. Bull. 180: 166(key to males); 176.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:392(key to males).

1952. Mycomya nigricauda, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:190(key to species) ----- NEW YORK.

Mycomyia simplex(Coquillet),1905.

1905. Sciophila simplex Coquillet, Jour. N.Y. Ent. Soc. 13:67, 10 males, 1 female ----- BRITISH COLUMBIA.

1909. Mycomya simplex, Johannsen, Genera Insectorum 93:50 ----- new combination.

1910. Mycomya simplex, Johannsen, Maine Agric. Exp. Sta. Bull. 180: 165(key to males); 170(key to females); 173.

Mycomyia sequax Johannsen, 1910.

1910. *Mycomya sequax* Johannsen, Maine Agric. Exp. Sta. Bull. 180:166 (key to males); 168 (key to females); 172, 1 male, 1 female ----- NEW YORK.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:391 (key to males).

1952. *Mycomya sequax*, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:189,190 (key to species) ----- MAINE, NEW YORK.

The terminalia of the type are missing. Several species known to me fit the description and figure given by Johannsen.

Mycomyia mutabilis Sherman, 1921.

1921. *Mycomya mutabilis* Sherman, Proc. Ent. Soc. Brit. Col. 1920:16, 1 male ----- BRITISH COLUMBIA.

Mycomyia californica Van Duzee, 1928.

1928. *Mycomya californica* Van Duzee, Proc. Calif. Acad. Sci. 17:40, 1 male, 1 female; fig.6 (male terminalia) ----- CALIFORNIA.

Mycomyia fuscipalpis Van Duzee, 1928.

1928. *Mycomya fuscipalpis* Van Duzee, Proc. Calif. Acad. Sci. 17:40, 1 male; fig.7 (male terminalia) ----- CALIFORNIA.

Species Described From Female Types Which Have Been Examined

Mycomyia biseriata (Loew), 1869.

1869. Sciophila biseriata Loew, Berl. Ent. Zeit. 13:140, 1 male ----- CANADA.

1909. Mycomya biseriata, Johannsen, Genera Insectorum 93:46 ----- new combination.

1910. Mycomya biseriata, Johannsen, Maine Agric. Exp. Sta. Bull. 180: 167(key to males); 169(key to females); 178; fig.139(female terminalia) ----- CANADA, BRITISH COLUMBIA.

1937. Fisher, Jour. N.Y. Ent. Soc. 45:391(key to males).

1952. Mycomya biseriata, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:189(key to species); 190 ----- MAINE, VERMONT.

The type(1220) of this species at the Museum of Comparative Zoology(Harvard University) is a female, not a male. The species is not known from males, therefore its position in keys to the males is based on an erroneous determination of sex of Johannsen (1910).

Mycomyia onusta (Loew), 1869.

1869. Sciophila onusta Loew, Berl. Ent. Zeit. 13:138, 1 female ----- DISTRICT of COLUMBIA.

1909. Mycomya onusta, Johannsen, Genera Insectorum 93:49 ----- new combination.

1910. Mycomya onusta, Johannsen, Maine Agric. Exp. Sta. Bull. 180:169

(key to females); 184.

1952. _Mycomya onusta_, Shaw and Fisher, Connecticut Geol. and Nat. Hist. Surv. Bull. No.80:190 ----- MAINE, MASSACHUSETTS.

Mycomyia _recurva_ Johannsen,1910.

1910. _Mycomya_ _recurva_ Johannsen, Maine Agric. Exp. Sta. Bull. 180:170 (key to females); 185, 1 female ----- WISCONSIN.

1910. _Mycomya_ _recurva_ _chloratica_ Johannsen, Maine Agric. Exp. Sta. Bull. 180:185, 1 female ----- WISCONSIN.

Mycomyia _incompta_ Johannsen,1910.

1910. _Mycomya_ _incompta_ Johannsen, Maine Agric. Exp. Sta. Bull. 180:170 (key to females); 186, 2 females ----- BRITISH COLUMBIA, NEW YORK, MAINE.

Species Described From Females (Types Not Seen).

Mycomyia _unicolor_(Walker),1848.

1848. _Leia_ _unicolor_ Walker, List. Dipt. Brit. Mus. 1:93 ----- CANADA.

1909. _Leia_ _unicolor_, Johannsen, Genera Insectorum 93:80.

1910. _Leia_ _unicolor_, Johannsen, Maine Agric. Exp. Sta. Bull. 180:279 (key to species); 285 ----- notes that generic position cannot be determined by Walker's description.

1926. Johannsen, Can. Ent. 58:51 ----- new combination.

<u>Mycomyia</u> <u>angulata</u>(Adams),1903.

1903. <u>Sciophila</u> <u>angulata</u> Adams, Kans. Univ. Sci. Bull. 2:22, 1 female ----- COLORADO.

1909. <u>Mycomya</u> <u>angulata</u>, Johannsen, Genera Insectorum 93:46 ----- new combination.

1910. <u>Mycomya</u> <u>angulata</u>, Johannsen, Maine Agric. Exp. Sta. Bull. 180: 170(key to females); 186.

THE GENUS *ECHINOPODIUM* FREEMAN, 1951.

1951. Freeman, Dipt. Patagonia and South Chile III:30, 45 ------ type species *Echinopodium nigricoxa* Freeman.

Ocellar prominence not well-developed; eyes nearly oval, very slightly emarginate above antennae; mouthparts somewhat elongate, much larger and more conspicuous than in *Neoempheria* and *Mycomyia* (except one undescribed California species); scutellum with two long setae; postnotum with median ventral setae; metaepimeron setiferous; anterior tibia with a number of short peg-like setae and with the spur broad, flattened and serrate; male with mesocoxal spur always present; male terminalia with a simple tergal portion, the sternal portion with inner style of various forms.

This description of the genus is adapted from Freeman (1951).

Four species are known in the genus. I have seen two of these and in addition two new species are described. A new key to species follows.

Key to the known species of male <u>Echinopodium</u>*

1. Mid and hind coxae suffused laterally; mesonotum completely suffused or barely lighter laterally ---------------------------------- 2.

   Mid and hind coxae yellowish, hind coxa slightly suffused or not; humeri yellowish -- 3.

2. Inner style with scattered apical and subapical short, stout setae; apex of basistyle simple; median process not reaching apex of basistyle ---------------------------------- <u>nigricoxa</u> <u>Freeman</u>,1951

   Inner style with five large apical spur-like setae; apex of basistyle bifid; median process narrow and reaching apex of basistyle -- <u>chiloensis</u> n.sp.

3. Anterior tibial spur one-eigth length of forebasitarsus, broad, and strongly curved -------------------------- <u>curvispina</u> Freeman,1951

   Spur at least one-fifth of forebasitarsus, straight and narrow - 4.

4. Forebasistarsus clearly longer than second tarsal segment; dististyle with a long narrow seta-like subapical process -- <u>flagellatum</u> Freeman,1951

   Forebasitarsus shorter than or subequal to second tarsal segment; dististyle without long narrow seta-like subapical process --- 5.

5. Inner style with a row of short setae; mesal apical fold of tergal portion wide, with scattered peg-like setae to lateral margin -- <u>digitalis</u> Freeman,1951

   Inner style with six long setae along apical margin and a small

---

*Adapted from Freeman,1951.

subapical lobe with five very small peg-like setae; mesal apical fold of tergal portion narrow with scattered setae mostly along apical margin and setae not reaching lateral margin -- rionegrensis n.sp.

<u>Echinopodium curvispina</u> Freeman, 1951.

1951. Freeman, Dipt. Patagonia and South Chile III:46(key to species); 47, 1 male, 1 female; fig.85(mesocoxa of male); figs.94,95(male terminalia) ----- CHILE(holotype-male); ARGENTINA.

I have not seen this species.

<u>Echinopodium flagellatum</u> Freeman, 1951.

1951. Freeman, Dipt. Patagonia and South Chile III:46(key to species); 48, 15 males, 7 females; fig.86(mesocoxa of male); figs.96-98(male terminalia) ----- ARGENTINA(holotype-male); CHILE.

I have not seen this species.

<u>Echinopodium nigricoxa</u> Freeman, 1951.

1951. Freeman, Dipt. Patagonia and South Chile III:46(key to species); 46, 28 males, 11 females, fig.82(head); fig.83(foretibia); fig.84 (mesocoxa, male); figs.88-90(male terminalia) ----- ARGENTINA(holotype-male); CHILE.

Additional records: CHILE: 1 male, Victoria, Oct.25,1932; 1 male, Cautin, Rio Blanco, Termas, Cuva(?), March 28,1938.

Additional specimens: ARGENTINA: Rio Negro, 4 males, Correntoso, Nov.18-25,1926(R. and E. Shannon); 1 male, Puerto Blest, Dec.2,1926 (R. and E. Shannon).

<u>Echinopodium digitalis</u> Freeman,1951.

1951. Freeman, Dipt. Patagonia and South Chile III:46(key to species); 47, 2 males, 2 females; fig.87(mesocoxa of male); figs.91-93(male terminalia); CHILE(holotype-male); ARGENTINA.

Additional records: ARGENTINA: Rio Negro, 1 male, Correntoso, Nov. 18-25,1926(R. and E. Shannon).

Observations: The male specimen here studied is considered to constitute an additional record since the other Correntoso, Argentina records are based on determinations of female specimens.

<u>Echinopodium chiloensis</u> n.sp.

Male: Head fuscous; ocellar bristles very small, not reaching ocelli; clypeus with setae like those on palpi or longer; palpi and mouthparts yellowish; antenna with scape, pedicel and base of first flagellar segment yellowish; first flagellar segment longer than scape and pedicel; apical dorsal seta of pedicel short, about one-half as long as first flagellar segment.

Thorax: fuscous; anterior and posterior pronotum, proepisternum and proepimeron somewhat lighter; postspiracular plate yellowish; mesonotum fuscous, barely lighter laterally or not, setae generally short and fine; scutellum and postnotum dark, former with scattered short, fine setae, latter with median ventral patch of setae; forecoxa yellowish, mid- and hindcoxae suffused; mesocoxal process(fig.128); femora, tibiae and tarsi yellowish; foretibia and forebasitarsus subequal, basitarsus longer than tarsus 2; foretibial spur about one-fourth length of tibia, curved; wing with Sc_2 ending about middle of R_{1+2+3}; Sc bare; M_{1+2} bare, M_1, M_2, M_4, Cu and Cu_1 setose; M_{1+2} shorter than M_2 which is equal to Cu_1; fM_{1+2} distad of R_4; posterior fork below cell R_3; halters yellowish.

Abdomen: fuscous, posterior margins tergites II-VI appearing lighter; TVIII subquadrate, posterior margin setose; SVIII broad, band-shaped, posterior margin setose.

Terminalia: (figs.126 and 127); tergal portion setiferous, subtriangular with apex truncate, mesal surface bearing a number of short peg-like setae which do not extend to lateral margin. Sternal portion with basistyle setiferous, apically somewhat bifid, outer lobe short, blunt, setiferous; median lobe flattened, truncate bare; inner style flattened, reaching slightly beyond tip of median lobe, with five strong apical spines and several fine setae; a median finger-like process with scattered setulae; inner process fused basally, subtriangular, truncate apically; parameres short; aedeagus elongate, notched apically. Anal segment short.

Female: Unknown.

Holotype: CHILE: Butalcura, Chiloe Is., April 4-5,1920(Cornell U. Exped.) male.

Paratype: ARGENTINA: Porto Blest, Rio Negro, Dec.2,1926(R. and E. Shannon) 1 male.

Observations: This species is most closely related to nigricoxa from which it may be distinguished primarily by the form of the mesocoxal spur of the male or the male terminalia. No other known species of Echinopodium presents the form of the inner style that is shown in chiloensis.

Echinopodium rionegrensis n.sp.

Male: Head fuscous; ocellar bristles very small, not reaching ocelli: clypeus reddish-brown, sparsely setose, setae like those on palpi; palpi and mouthparts yellowish; antenna with scape, pedicel and first two or three flagellar segments yellowish; first flagellar segment longer than scape and pedicel; apical dorsal seta of pedicel short, about one-half as long as first flagellar segment.

Thorax: pleura with anepisternite, katepisternite, mesoepimeron and pleurotergite suffused, remainder yellowish; mesonotum fuscous with humeral area yellowish, setae generally short and fine; scutellum and postnotum dark, former with scattered short, fine setae, latter with median ventral patch of setae and a median longitudinal light line; coxae yellowish, hindcoxa slightly suffused laterally; mesocoxal process(fig.129); femora, tibiae and tarsi yellowish; foretibia, basitarsus and tarsus 2 subequal; tibial spur about one-fourth length of tibia, slightly curved; wing with Sc_2 ending about middle of R_{1+2+3};

Sc bare; M_{1+2} bare, M_1, M_2, M_4, Cu and Cu_1 setose; M_{1+2} shorter than M_2 which is longer than Cu_1; fM_{1+2} distad of R_4; posterior fork below base of cell R_3; haltere yellowish.

Abdomen: fuscous; TI light laterally; TII-TIII with light anterior posterior and lateral margins; TIV light lateral and posterior margins; TV light posterior margin; TVIII subquadrate, posterior margin setose; SVIII broad, band-shaped, posterior margin setose.

Terminalia: (figs.150 and 151); tergal portion setiferous, subquadrate with apex truncate and emarginate, mesal fold narrow with peg-like setae almost entirely confined to posterior margin and not extending to lateral margin. Sternal portion with basistyle setiferous, rounded apically; inner style flattened, not reaching tip of basistyle, with a row of six long spine-like setae along apical margin and a subapical lobe about as long as apical setae which bears five apical peg-like setae; a median process present which is closely associated with basistyle and which is obliquely truncate, apical margin bearing several long fine setae; parameres short; aedeagus elongate, apically pointed. Anal segment short.

Female: Unknown.

Holotype: ARGENTINA: Rio Negro, Correntoso, Nov.18-25,1926(R. and E. Shannon).

Observations: This species is closely related to curvispina from which it may be separated on the basis of the form of the mesocoxal spur of the male and the shape of the inner style.

THE ZOOGEOGRAPHY OF THE MYCOMYIINI

Introductory Discussion

One of the problems with which biologists are concerned is the distribution of life. Admittedly this is a study which must be replete with hypotheses for it is an historical study as well as a study of contemporary forms. Fossils hold the key to the historical part of such an investigation. The key is now available for certain well-preserved groups of plants and animals. Fossilization is, however, a matter of chance and many critical gaps exist even in the groups most completely studied. Even when fossilization has occurred, future geologic events may destroy the "record of the rocks." Because the fossil record is comparatively poor, much work on distribution is concerned with modern forms. Strangely enough, a study of modern forms, in turn, may be a clue to the geological history of various groups.

A large amount of information concerning fossil insects is available. However, many critical gaps exist in the knowledge of the origin of the class, the modern orders and the lower systematic categories. Carpenter (1953) has expressed his views on the history of the insects. While he has been able to give a reasonable picture of their evolution, he has been unable to go into detail. It would seem that modern distribution of monophyletic lower taxonomic categories is dependent, not on ancient forms, but on the appearance of relatively recent forms. The zoogeographer, therefore, need not go further back in time than the fossil record warrants. For certain of the suprageneric categories of the Diptera, that time would be the Jurassic period. Present evidence seems to indicate that modern generic forms appeared in the Mesozoic. Many such are found in Baltic amber. The Cretaceous period, at the close of the Mesozoic era, and the Paleocene epoch at the beginning of the Cenozoic era form one of the great gaps already mentioned as existing in fossil history.

Fossil Mycetophilidae are found in the Jurassic rocks. Although Rohdendorf (1946) has erected new families for the forms he described, I would raise them only to subfamily or tribal status as explained earlier in this thesis.

Fossil species of Mycomyia and Neoempheria have been described from several geological epochs, the Oligocene amber specimens forming the bulk of the described fossil species. Since I have not seen the specimens involved in the descriptions, it would be presumptuous to pass on the validity of the generic position assigned to the species. It seems reasonable that the specimens from the Baltic amber are correctly placed, for they can be viewed from many angles and are well-preserved. On the other hand, less finely preserved species, such as that described by Johannsen (1912) from Miocene shales must be regarded with great suspicion. He recognized the genus Mycomyia through the apparent presence of mesocoxal spurs. It is of interest to note that the spurs curve ventrad, a condition not known in modern forms. The amber Mycomyiini will assume their full importance when the number of species and their group relationships are known. In the Mycomyiini then, the fossil record is of little help as yet. Therefore a study of contemporary forms is undertaken with the hope that these modern forms may indicate something of the past history of the tribe.

Only a study of a group over a wide geographic range can indicate the type of information needed in the problem outlined above. A group which is well-known must be selected and it is for this reason that the descriptive part of this paper became necessary. Most of the studies of zoogeography have been done at the generic level or with higher taxonomic categories (see below). This study will attempt to evaluate the distribution of the Mycomyiini at the species level, or at least at a level below the generic concept.

Most of the work on which the current principles of distribution have been founded is concerned with the distribution of plants or vertebrates. These conspicuous groups, which attract the attnetion of collectors, are far better known to the museum workers than are the less noticeable invertebrate groups.

Lane (1943) admirably summed up the distributional patterns which had been proposed for South America by previous authors. A series of eight maps (Pl.18) showed the divisions based on a study of fossil and contemporary groups of animals and, in addition, his study of the sabethine mosquitoes. An additional map indicated "pathways of spread" postulated from his study of the Sabethini. Lane's available material totalled more than 260,000 specimens. Although the number of specimens in the following study falls far short of that number, it is of interest to compare previously noted distributions, particularly Lane's, with that of the Mycomyiini.

Not all the material at hand is described in the systematic portion of this study, therefore, undescribed species will be referred to group categories and a mention will be made of the place of capture. In this way unnamed material which has a bearing on the distributional problems can be included.

The knowledge of the fauna of many areas is still fragmentary though certain patterns of distribution are beginning to appear. Some seem to be at variance with the known distributions of higher categories. In particular, the wide geographic range of some species is remarkable. Little information has been published on the patterns of distribution and it is hoped that distributional evidence from a study of the Mycomyiini may strengthen known hypotheses and possibly stimulate further research in other groups.

Material is not available from all areas in the regions. However, it is felt that the great amount of collecting done in the Californian, Chilean and New Zealand subregions is sufficient to justify the theory that the absence of Neoempheria is an actual absence, not a collecting vacuum. All generalizations are based only on the distribution of the species in the section of this paper in which they occur. They are not to be construed as being conclusions drawn from a study of many groups of plants and animals.

THE DISTRIBUTION OF *NEOEMPHERIA*

In general, *Neoempheria* can be said to be present in all the regions of the world. It is by no means equally well developed in each region and in parts of some regions it is entirely absent. One species has been described from the Ethiopian Region but very few from the Oriental Region. Edwards (1940) stated, however, that species are numerous in those regions.

Neoempheria is poorly developed in the Australasian Region, no species being known from New Zealand. The Nearctic and Palaearctic Regions also have a poorly developed fauna. Only seven species are known from each of the regions and the genus is apparently absent in the Californian and Sonoran subregions of the Nearctic Region.

The genus is most highly developed, or at least has been best studied, in the Neotropical Region. Even in this area, however, the distribution is restricted and the genus has not been reported from the Andean chain of mountains nor the Chilean subregion. It is interesting then, that the genus is present in three regions and that in each of the three regions it is absent in the one subregion whose biotic affinities have been discussed by students of the distribution of life forms.

In the Americas, the genus is not yet reported north of 50 degrees N. Lat. and is not reported south of 30 degrees S. Lat. The following is a report based on positive features of the distribution of *Neoempheria*.

In the Neotropical Region, our knowledge of the genus Neoempheria is still fragmentary, but, several points of distribution are worth noting. The neivai group of three species is distributed along the pathway postulated by Lane (1943) as the probable path of species dispersal for the sabethine mosquitoes.

The bipectinata group, one species, is found in the high plateau region of southeastern and central Brazil.

The spinosa group, five species, thus far is known to occur in southeastern Brazil.

The maculipennis group, seventeen species, is well developed along the latitude of the Tropic of Capricorn from the coast of Brazil to 65 degrees West Longitude and in the southern portion of Central America. Several species occur on the eastern side of the Andean range just south of the equator, and a single species has been reported from the West Indies. The closest relationships of the West Indian maculipennis are with two species from Panama, panamensis and lanei, and with bradleyi from northeastern Peru.

The ornatipennis group, nineteen species, is somewhat similar to the maculipennis group in distribution, but, the species are grouped in the well-collected areas rather than strung out along the latitude of the Tropic of Capricorn. In addition, one species is from the Brazilian State of Goiaz and another from the State of Bahia. A single species is found on the eastern side of the Andean range, another in British Guiana, and two more in Costa Rica. This group and the maculipennis group are beginning to fit into the pattern of dispersal postulated by Lane.

The lindneri group, four species, has four scattered representatives, one in southeastern Brazil, a second in Peru along the eastern side of the Andes, and one each in Panama and Costa Rica. The distribution although very incomplete is like that of the neivai, maculipennis and ornatipennis groups.

The johannseni group, two species, is only known from southeastern Brazil in the State of Santa Catarina.

The costa-limai group, four species, although poorly known, seems to follow the distribution of the ornatipennis group. Two species are known from southeastern Brazil, a third from the State of Goiaz and the fourth from Costa Rica.

The biflagellata group, two species, is known only from southeastern Brazil in the State of Santa Catarina, and along the latitude of the Tropic of Capricorn.

The jugalis group, one species, is found in southeastern Brazil along the latitude of the Tropic of Capricorn.

The faceta group, one species, is found in northern Argentina, just north of the latitude of the Tropic of Capricorn.

The costaricensis group, one species, is found only in Costa Rica.

The portoricensis group, one species, is found only in Puerto Rico.

The vogeli group, two species, is found in southeastern Brazil and has the same distribution as the biflagellata group.

The rabelloi group, one species, is found in southeastern Brazil along the latitude of the Tropic of Capricorn.

The pereirai group, two species, is found in nearly central Brazil and is the only group so far known to deviate from the distribution pattern of the other groups.

The paulensis group, one species, is found in southeastern Brazil along the latitude of the Tropic of Capricorn.

The brasiliensis group, one species, is found in southeastern Brazil along the latitude of the Tropic of Capricorn.

In the Nearctic Region, although only seven species are considered to be present, the distribution of these few species is not well known. In general the genus appears to be confined to southeastern and eastern United States, eastern Canada and the midwest. Only one species is reported from west of Iowa.

The most poorly collected and least widely distributed species is N. nepticula which is known only to occur in Georgia and North Carolina. N. nepticula is closely allied to the northern form N. impatiens which occupies the high areas of the Appalachians in North Carolina and is found as far north as Quebec.

A wide but discontinuous range is exhibited by N. balioptera. It has been taken at 3000' in Tennessee. To the north, the next collection record is in Pennsylvania. It has also been taken in New York and New Jersey but not New England. North of these areas it is found in Quebec. It is also found in Illinois and Iowa in the midwest. The records for this species present a picture of a very discontinuous distribution. This is probably not the actual case and it seems certain that further collecting will fill the gaps in the presently known range of the species. The distribution of N. balioptera fits the general distribution for the genus in the Nearctic Region. It will be interesting to get further records of this species for it is closely related to the European N. lineola. Information on the range of these two species might shed light on the manner by which these two unusual species assumed their present distribution.

A range similar to that of N. balioptera is found for N. macularis. In addition it is found in New England. I cannot locate the Trinity Bay location in Quebec and there is a possibility that this may be Trinity Bay, New foundland. N. macularis is also found in Iowa. It seems probable that its apparently discontinuous range is due to a lack of material in collections. Like N. balioptera its range is concordant with the general distribution of the genus in the Nearctic area.

Some variation from the range known for N. balioptera and N. macularis is found in N. didyma. The latter species occurs in Virginia, Pennsylvania, New York, Massachusetts, New Hampshire, Maine and Quebec. To the west it has been reported from Michigan, Wisconsin and Ontario (type). In addition, it is found in the valley of the Columbia River in British Columbia. This area is surrounded by high mountains through which no low passes seem to occur except for that of the river to the south. Since no species of Neoempheria has been reported from an altitude of more than 3000', and this from a lower latitude, the question arises as to the status of the British Columbia population. It is separated, as far as known, from the nearest other population of the species by a distance of about 1300 miles. No Neoempheria are reported from the southern area through which the Columbia River flows. Is this really an isolated population? If so, does it have a larger range than indicated here? If the range is continuous with that of the eastern population, where and how does it cross the high mountains? The answer may be found in a survey of the Kootenai River Valley and Crowsnest Pass on the border of British Columbia and Alberta. The valley of the tributaries of the Saskatchewan River in turn could serve as a connecting link to the lower altitudes of the central provinces of Canada.

Although there are several gaps in the distribution of N. indulgens, it occupies only the general range already mentioned for the other species. In the southeast it is found in Tennessee, North Carolina, Virginia, West Virginia and Maryland. In the northeast it is found in New York, Vermont and Quebec. In the central states it is found in Indiana and Iowa.

Finally, N. illustris is found from the higher altitudes of Georgia, north to Ontario. In addition, it is found in Florida, both in the tropical and subtropical portions, 400 to 500 miles from the Georgia population. It will be interesting to complete the intermediate distribution, if it occurs. The species is also recorded from Iowa, as far west as Sioux City. It is the only Nearctic species that shows strong affinities with species from the Neotropical Region. Those affinities are with the ornatipennis group which is the largest and one of the most widespread groups in that region.

Some generalizations now seem to be in order with regard to the distribution of the genus Neoempheria. It is the only group of insects known to me which shows the relationships of the Nearctic Californian subregion, the Neotropical Chilean subregion and the Australasian New Zealand subregion by a negative feature of distribution. In the Americas, the genus appears to be restricted in range by mountain barriers which apparently protect the Chilean and Californian subregions from an influx of Neoempheria. Very high mountain ranges such as the Nearctic Rocky Mountains and the Neotropical Andes do not seem to be favorable to the development of any species.

The Nearctic fauna of Neoempheria appears to be nearly restricted in range to the eastern and the north central portion of the region. Of the seven species, one, N. illustris, shows strong affinities with the Neotropical species. One, N. balioptera, shows strong affinities with a Palaearctic species. Three species seem to come from the same stock as the Neotropical groups, particularly one undescribed form, and two show no affinities with any other species known to me. The genus is poorly developed in the Nearctic Region.

The Neotropical Neoempheria are numerous. There are undoubtedly many new forms remaining to be discovered. The distribution of Neoempheria in Latin-America is heavily concentrated along the Tropic of Capricorn. It is an excellent indication of where the collectors have been most active. Other than this, the distribution of the large groups is much the same as that indicated by Lane(Pl.18, map 9) as a dispersal pattern for the sabethine mosquitoes. That is, from the Central American land mass, into Colombia and around the periphery of

South America on both the east and west coast and spread out along the Tropic of Capricorn. On the western side of the land mass, the genus is distributed along the eastern side of the Andes.

Although many groups appear to be endemic to southern Brazil, this may be the result of the more intensive collecting done in that area. Only one group is endemic to Central America although six groups are found there. The Antillean subregion so far shows only Neotropical affinities. The maculipennis group occurs in the West Indies and Cuba (a specimen not included in the systematic portion of this paper). The portoricensis group is known only from Puerto Rico, but is definitely a Neotropical form.

As far as it is possible to determine at present, the genus Neoempheria is best developed in the Neotropical Region. The species in the genus show affinities which allow them to be grouped according to morphological characters which are supported by characters derived from the pattern of the wing.

THE DISTRIBUTION OF MYCOMYIA

The genus Mycomyia is present in all the biotic regions of the world. It is apparently equally well developed in the tropical and temperate areas. The genus is one of the largest in number of species in the family and may prove to be one of the largest genera of Diptera. The striking difference in development of the genus Neoempheria in the Americas is not pertinent to Mycomyia. At present the genus has been found at 69 degrees North Latitude which is well north of the Arctic Circle, and is known southwards to about 40 degrees South Latitude. In Colorado, at least one species has been found at 10,000 feet altitude. Another is reported to be common at 8,000 feet in British Columbia though very rare at altitudes of 1,000 to 3,000 feet. The largest (wing 8mm.) and darkest species occur in the northern portion of the temperate areas. Some of the species of the high altitudes of the Chilean subregion are also very dark.

In the Neotropical Region, the Chilean subregion appears to have a fauna composed of endemic species. There is, however, one group, the coxalis group which is composed of two Chilean species and a new species described in this paper which is found in southeastern Brazil. This is the first species of fungus gnat known to me which shows an affinity between the Chilean subregion and eastern South America. This type of distribution has not been emphasized by workers in other groups. However, it is known to occur with the Araucarian pines, certain crane-flies and the net-winged midges. It would seem logical that the postulated Antarctic land bridge would have allowed spread of a fauna equally well into all portions of South America. Perhaps this actually happened and a subsequent change to a tropical climate in the equatorward area, or the joining of Archiplata and Archamazonia with the subsequent invasion by northern types, caused the temperate climate fauna to disappear. It is also possible that connecta from southeastern Brazil is the northernmost range of the Chilean-Patagonian fauna. There is a difference of 18 degrees between the area from which coxalis and connecta are taken. In this case the distribution might be explained by the fact that the many forms found in the Chilean subregion were received through the high cordillera while only a few forms were able to penetrate the tropical eastern portion.

The furcata group exhibits another interesting case of distribution. The New Zealand species furcata is known to me only by description. It is, however, clearly related to a species, pontis, from southeastern Brazil which is described in the taxonomic portion of this paper. This particular type of distribution has not, so far as I am aware, been noted for any other insects, although it is recorded for the frogs (Metcalf 1929, from Alexander).

Both M. connecta and M. pontis which show the affinities discussed above are species without mesocoxal spurs.

The manteri group, eleven species, is known only from southeastern Brazil and so far is heavily localized in the State of Sao Paulo.

The samesteri group, four species, has the same distribution as the manteri group except that it is not known from outside of the State of Sao Paulo.

The *spacra* group, seven species, has the same distribution as the *manteri* group.

The *citrina* group, one species, is reported only from Costa Rica.

The *obliqua* group, one Neotropical species, is only known from southeastern Brazil. The Nearctic species *obliqua* is one of the commonest and most widespread species in that region.

The *tantilla* group, ten described species, is found distributed in southeastern Brazil and northern Argentina along the latitude of the Tropic of Capricorn. Two of the species also are found in the central plateau of Brazil in Goiaz. A single undescribed species is found in Panama. One of the species, *cleta*, is closely related to the Nearctic species *tantilla* and *kiamichii*. Fisher (1939) has reported *tantilla* from Costa Rica.

The *dumeta* group, one described species, is found on southeastern Brazil. An undescribed, but closely related species is found in Argentina a t the latitude of the Tropic of Capricorn.

The *campestra* group, one species, is known only from the State of Sao Paulo.

The *imitans* group, one described species and thirteen undescribed species, is widely distributed. Although the group takes its name from a Nearctic species, it is best developed in the Neotropical Region. Seven of the species are known only from southeastern Brazil. One is reported from Tucuman, Argentina which is three degrees south of the Tropic of Capricorn. Another is found in southeastern Brazil and Costa Rica. Three occur in Colombia. The species *borinquensis*, which is described in an earlier portion of this study, is found in southeastern Brazil, the central plateau of Goiaz and Mato Grosso and on the island of Puerto Rico in the Antillean subregion. While the affinity of species in the Antillean subregion is considered to be with that of species from the Central American, here is one that occurs in southeastern and central Brazil. How did it reach the Antilles? There are several possible explanations. The species may also occur in the Guiana Highlands and may have invaded the Antillean subregion through Trinidad and the Lesser Antilles. Secondly, it may follow the general distribution of the genus along the latitude of the Tropic of Capricorn and north on the eastern flank of the Andes into the Mexican subregion. It may also have reached the Mexican subregion through the eastern Guiana Highlands. Possibly the species is peripheral in Amazonian South America and invades the Mexican subregion from east and west. It would be most surprising if the range of borinquensis proves to be truly discontinuous. As supporting evidence for the fact that a species can have a range such as hypothesized for borinquensis, one undescribed species is found in southeastern Brazil, Costa Rica and the eastern coast of central Mexico.

In addition to the groups mentioned above, three more apparently are restricted to southeastern Brazil. One of these has the wings infuscated on the apical two-fifths and another has a trifid mesocoxal spur. A fourth group is found in Guatemala.

A summary of the distribution of Neotropical Mycomyia indicates the following facts. Certain groups of the genus have definite affinities with species occurring in the Nearctic Region. As far as can be determined from available material, most of the forms appearing in the Nearctic Region have been derived from the Neotropical Region while only one Neotropical form can be doubtfully said to have a northern derivation. This conclusion is drawn from the fact that in the groups involved in the relationship, none are better developed in the Nearctic Region. One doubtful case exists. The obliqua group is Nearctic and Palaearctic, the latter area being represented by the European circumdata. Since the group is so widely distributed in the temperate northern land mass, it is considered to have originated there.

Relationships are shown at the species level between southeastern Brazil and New Zealand and between southeastern Brazil and Chile.

The Antillean subregion, insofar as known, shows affinities with the Neotropical Region. No affinities are yet evident between that subregion and the Nearctic Region.

The Chilean subregion has a fauna that is almost entirely independent of the remainder of the region.

In the Nearctic Region, the genus Mycomyia is represented by a well developed fauna. Collection data are numerous enough to give some information as to the distribution of the species in the region.

The zones which are referred to in the following discussion (Pl.19) are those proposed by Van Dyke (1940), which are a modification of those proposed by Merriam (1898). Van Dyke's modifications are based on a study of Coleoptera.

M. obliqua has been discussed under the Neotropical Region as far as the affinities of the group are concerned. In the Nearctic Region, the species occurs from southeastern United States, that is the Appalachian Range of Tennessee and North Carolina, north to Quebec and Ontario and west to British Columbia.

The imitans group has been discussed under the Neotropical Region. In the Nearctic Region, it has much the same range as obliqua.

The tantilla group has been discussed under the Neotropical Region. In the Nearctic Region, it is reported from Maine westward to Saskatchewan and Wyoming, New Mexico and Costa Rica. The closely allied species kiamichii is found in Oklahoma and Iowa. No other species known to me shows a distribution that approaches the one exhibited by tantilla.

The species hirticollis has a distribution like that of obliqua, its western range ending in the Vancouveran Zone of Washington and Oregon. In addition, there are two species in the west which are closely related to hirticollis. One of these, hirticauda, occurs in the Vancouveran Zone from north of San Francisco into Washington and western Oregon. The third species, an undescribed form, has been found only in Sequoia National Park. This area is in a tongue of the Vancouveran Zone.

A complex of species is closely related to littoralis. Some of those species are found in the Palaearctic Region. In the Nearctic Region, littoralis is found north from the Appalachian Range of Tennessee and Virginia to Quebec and Ontario and west to Minnesota and southwards to Missouri. A closely allied species sublittoralis is also found north from Tennessee and North Carolina to Ontario. It occurs as far west as western Montana and Alberta in the Vancouveran Zone. Another closely allied species frequens occurs in the Vancouveran Zone near San Francisco and to the east of the San Joaquin Valley in Yosemite National Park, in a tongue of the Vancouveran Zone. A fourth allied species dentata has nearly the range of littoralis but is not reported from the south central state of Missouri.

The species sphagnicola is reported from North Carolina, New York, Newfoundland, British Columbia and Oregon. These localities are in four different zones, i.e. the Alleghenian, the Canadian, the Hudsonian and the Vancouveran. A closely related species intermedia is found in California in the northern part of the Sonoran Zone.

M. fragilis is found in Alabama, north to New Hampshire and westward to Minnesota.

M. brevivitta is found in New England and Quebec, westwards to Wisconsin. It is also found in British Columbia.

The species alternata is found from Tennessee and North Carolina north to New England and is also found in Iowa, Wyoming, British Columbia and Washington.

The species nugatoria is reported from North Carolina, Massachusetts, Quebec, Iowa and Wisconsin.

The species triacantha is found in Tennessee, North Carolina, and New Hampshire.

The species scopula is found in New York, Vermont and Quebec. The related species parascopula is found in Maryland and Iowa.

The species sigma is reported from North Carolina, New York, Massachusetts, Wyoming and Idaho.

The species maxima is reported from Labrador, Maine, New Hampshire, Vermont, Massachusetts, New York, Alberta and Oregon.

The species flavohirta occurs in New Hampshire, Ontario and British Columbia.

The species of the terminata complex are distributed as follows. The easternmost species dichaeta is found in Maryland, Delaware, New York, Massachusetts, New Hampshire and Iowa. To the west, terminata is found in British Columbia and Vancouveran Oregon. The third species fulvitibia is found in the southern portion of the California Vancouveran Oregon. The third species fulvitibia is found in the southern portion of the California Vancouveran Zone.

The species curvata has a distribution that seems rather unusual and, as explained in the taxonomic portion of this study, two populations may be represented. It occurs in Washington, British Columbia, Alberta, Montana and Wyoming. The dubious specimens are found in the Northwest Territory and Maine.

The species echinata is found in Vancouveran California, Oregon, Washington, British Columbia, Idaho, Montana and Utah.

The known range of other species would add little to the foregoing and therefore they are omitted from further discussion.

A summary of the distribution of Nearctic species would be more meaningful if the Palaearctic fauna of the genus Mycomyia were known and the faunas could be compared. Since this is not the case, a review of the region is presented without consideration of the implication of the effect of a widespread faunal group.

The outstanding distribution is that of species which are found in the southeastern United States at the southern end of the Appalachian Mountains. These species follow the mountains northward, sometimes at low altitudes and apparently escaping into the low piedmont area in North Carolina. They occur regularly at low altitudes in Maryland and are found to the north as far as Quebec. Although most of these records come from isolated pockets that have heretofore been known as remnants of the Canadian Zone, some of the records seem to indicate that for this particular group, the Canadian Zone may extend south to the end of the Appalachian Mountains. At least, the preponderance of collected material shows definite northern affinities. A well developed Appalachian fauna is not evident. To the west, the species are found at least two degrees south of Lake Erie, that is, south of the fortieth parallel. In Indiana and northeastern Missouri, the fortieth parallel is also the southern limit. In Iowa the forty-first parallel and in eastern South Dakota the forty-third parallel constitute the southernmost records. The effect of these records would be to move the southern limit of the Canadian Zone southwards two to four degrees in the region from south of Lake Erie to eastern South Dakota. Although I have not seen the areas from which the southern records of the species come and it could be argued that these are only isolated pockets, there are a great number of records along the forty-first parallel in Iowa. It would hardly seem that these are isolated pockets. Rather it would appear that this constitutes a definite southward extension of the Canadian Zone for _Mycomyia_. All other southward extensions proposed from less complete data for other states would concur with the findings in Iowa. In the far west, the zone would extend through southern British Columbia, Olympic National Park in western Washington, and northeastern Oregon. This area is considered to be Vancouveran by Van Dyke (Oregonian and Palusian, Dice, 1943). Generally the westernmost record for these species is found in eastern British Columbia. Thus the Vancouveran Zone is invaded not only by the Canadian, but its own fauna closely resembles that of the Canadian Zone.

The questions that remain to be answered in the Nearctic Region are as follows. Are the southern forms rare because they have not been collected? What is the endemic fauna of the region, or in other words, which groups among them show no affinities with any other groups in the Palaearctic and Neotropical Regions? What is the status of species in this genus in the Hudsonian and Arctic Zones? Is the Alleghanian Zone really a distinct faunal area for this genus? If so, must its limits be redefined? Other problems will arise, but these seem to be the ones suggested by the present study.

THE DISTRIBUTION OF *ECHINOPODIUM*

Little is known about this genus. It appears to be endemic to the Chilean subregion. A questionable affinity with an undescribed species of *Mycomyia* from California might be based on a similarity in the elongate mouthparts.

SUMMARY

A review and revision of the Mycomyiini of the New World is here presented. Thirty-eight new species of Neotropical Neoempheria are described and one subspecies is elevated to species rank. A revision of the groups of Neoempheria proposed by Edwards (1940) is offered. A key to the groups is presented for the first time. A total of sixty-seven species is now reported from Latin America. In the Nearctic Region seven species of Neoempheria are treated. The male terminalia of two are figured for the first time. A new key is presented to aid in their separation. Records of their distribution are listed.

Neotropical Mycomyia are treated to a limited extent. In some cases the groups are not defined since many of the described species cannot be recognized and many of the Chilean species are not available for critical review. Seventeen new species of Neotropical Mycomyia are described bringing the total number of species reported in the region to seventy-three.

No new species are described in the section concerning Nearctic Mycomyia although a number are known in the author's collection. Many species have been unrecognized since the time of their original description and an attempt has been made by this author to ascertain their identity. The male terminalia of nine species are figured for the first time. The total number of species reported for the region is sixty. New records for many of the species are listed.

The genus Echinopodium, which is restricted to the Chilean sub-

region, has two more species added to it. There are now six described species in the genus. A few new records are added and a new key given for separation of the species.

The known distribution of species of all groups of the Mycomyiini is still based upon comparatively few records. A few are, however, worthy of mention. The absence of the genus _Neoempheria_ from the Californian, Chilean and New Zealand subregions indicates the affinity of these areas. The close relationship of known Antillean species is with the species of the Amazonian and Central American subregions. Excluding Chilean species, which form an endemic fauna, a wide range of many Neotropical species is indicated.

In the Nearctic Region there is some inconclusive evidence that the Alleghanian fauna of the tribe is of Canadian origin with few or no restricted species. Some of these species escape into the low areas along the southern limits of the mountain chain. Other records are present from areas to the south of the limit which heretofore has been considered to be the southern limit of the Canadian subregion. On the basis of the above information, it is suggested that, at least for this tribe of insects, the Canadian subregion must have its limits redefined. A close relationship is evident between the Vancouveran and Canadian fauna of the genus _Mycomyia_.

SELECTED REFERENCES

Adams, C.F.
1903 Dipterological Contributions.
Univ. Kans. Sci. Bull. 2:21-47.

Aldrich, J.M.
1905 A Catalogue of North American Diptera.
Smithsonian Misc. Colls. 46:1-680.

Alexander, C.P.
1928 A Comparison of the Systems of Nomenclature That Have Been Applied to the Radial Field of the Wing in the Diptera.
Fourth Int. Cong. Ent. 2:700-707, Pls.1-3.

Alexander, C.P.
1929 Diptera of Patagonia and South Chile, Part 1, Crane-Flies: xvi, 1-240, figs.1-258.

de Beaufort, L.F.
1951 Zoogeography of the Land and Inland Waters.
Sidgwick and Jackson Ltd., London: viii, 1-208, figs.1-10.

Bigot, J.M.F.
1888 Dipteres.
Mission Scientifique Cap Horn 6:1-45, Pls.1-4. From Hagen, 1862.

Blanchard, E.
1852 In Claude Gay, Historia Fisica y Politica de Chile, Zool. 7:344-349. From Freeman, 1951.

Brunetti, E.
1912 Diptera Nematocera. The Fauna of British India.
Taylor and Francis, London: xxviii, 1-581, figs.1-44, Pls.1-12.

Brunetti, E.
1920 Catalogue of Oriental and South Asiatic Nemocera.
Rec. Indian Mus. 17:1-300.

Buston, H.W.
1933 Note on the Chemical Nature of the Fluid from the Webs of Larvae of Platyura and Ceroplatus.
Trans. Ent. Soc. London 81:90-92.

Butt, F.H.
1934 Embryology of Sciara.
Ann. Ent. Soc. America 27:565-579, txt. figs.A-R, Pls.1,2.

Carpenter, F.M.
1953 The Geological History and Evolution of Insects.
Amer. Scientist 41:256-270, figs.1-7.

Coher, E.I.
1950 Neotropical Mycomyia I.
Rev. Ent. 21:561-580, figs.1-15.

Coher, E.I.
1952 Neotropical Mycomyia II.
Dusenia 3:215-224, figs.1-9.

Coquillet, D.W.
1901 New Diptera in U.S. National Museum.
Proc. U.S. Nat. Mus. 23:593-618.

Coquillet, D.W.
1904 In C.F. Baker. Reports on Californian and Nevadan Diptera, I.
Invertebrata Pacifica 1:17-40.

Coquillet, D.W.
1905 New Nemocerous Diptera from North America.
Jour. Ent. Soc. 13:67-69.

Crampton, G.C.
1942 External Morphology of the Diptera. IN Guide to the Insects of Connecticut, part VI, Fasc.1.
Connecticut State Geol. and Nat. Hist. Survey Bull. 64:10-165, figs.1-14.

De Geer, C.
1776 Memoires pour Servir a l'Histoire des Insectes.
Stockholm, Sweden: 6:1-522, Pls.1-30.

Dice, L.R.
1943 The Biotic Provinces of North America.
Univ. Michigan Press, Ann Arbor, Michigan: vii, 1-78, 1 map.

Dobzhansky, T.
1950 Evolution in the Tropics.
Amer. Scientist 38:209-221, figs.1-4

Dufour, L.
1839 Memoires sur les Metamorphoses de Plusiers Larves Fongivores Appartenant a des Dipteres.
Ann. Sci. Nat., Ser. II. 12;5-60, Pls.3. From Hagen,1862.

Dufour, L.
1841 Histoire des Metamorphoses du Sciophila striata.
Mem. Soc. Lille 1:201-207, Pl.I. From Hagen,1862.

Dziedzicki, H.
1884 Przyczynek do Fauny Owadow Dwuskrzydlych Gatunki Rodzajow: Mycothera, Mycetophila Staegeria.
Odbitka z Pamiet. Fizyjog. 4:298-324, Pls.5-9.

Dziedzicki, H.
1885 II. Przyczynek do Fauny Owadow Dwuskrzydlych. Rodzaje Nowe: Hertwigia, nov. gen. i Gatunki Rodzajow: Boletina, Sciophila.
Odbitka z Pamiet. Fizyjog. 5:164-194, Pls.4-9.

Dziedzicki, H.
1889 Revue des Especes Europeenas du Genre Phronia.
Horae Soc. Ent. Ross. 23:404-532, Pls.12-21.

Dziedzicki, H.
1910 Zur Monographie der Gattung Rhymosia Winn.
Horae Soc. Ent. Ross. 39:89-104, Pls.1-4.

Dziedzicki, H.
1915 Atlas des Organes Genitaux des Types de Winnertz et des Genres de Sa Collection de Mycetophiles.
Pub. Soc. Sci. Warsaw 3:1-16, Pls.1-21.

Edwards, F.W.
1913 Notes on British Mycetophilidae.
Trans. Ent. Soc. London 1913:334-382, Pls.12-18.

Edwards, F.W.
1924 Notes on Meigen's Fungus-Gnat Types.
Diptera 1:13-17.

Edwards, F.W.
1924 Notes on the Types of Diptera Nematocera (Mycetophilidae and Tipulidae) Described by Mr. E. Brunetti.
Rec. Indian Mus. 26:291-307.

Edwards, F.W.
1925 Notes on the Types of Mycetophilidae Described by Staeger and Zetterstedt.
Ent. Tidskr. 45:160-168.

Edwards, F.W.
1925 British Fungus-Gnats. With a Revised Classification of the Family.
Trans. Ent. Soc. London 1924:505-662, Pls.49-61, txt. figs. 1-4.

Edwards, F.W.
1927 Insect Collecting in the Southern Andes.
Nat. Hist. Mag. 1:111-125.

Edwards, F.W. and R.C. Shannon
1927 Expedicion Entomologica Argentino-Britanica al Noroeste de la Patagonia.
Rev. Inst. Bacter. 4:643-661.

Edwards, F.W.
1928 An Account of an Expedition to the Southern Andes.
Proc. Linn. Soc. London 1928:18.

Edwards, F.W.
1929 Introduction. IN Alexander, Diptera of Patagonia and South Chile, Part 1, Crane-Flies: xvi, 1-240, figs.1-258.

Edwards, F.W.
1929 An Account of a Collecting Trip to Patagonia and Southern Chile.
Trans. Fourth Int. Cong. Ent., Ithaca 2:416-417.

Edwards, F.W.
1931 New Neotropical Nematocerous Diptera.
Ann. Mag. Nat. Hist. 7:255-261.

Edwards, F.W.
1931 Mycetophilidae. Fauna Sumatrensis.
Over. Tijd. v. Ent. 74:262-278, figs.1-14.

Edwards, F.W.
1940 Redefinitions and Synonymy of Some Genera of Amber Fungus-Gnats.
Proc. Ent. Soc. London(B) 9:120-126.

Edwards, F.W.
1940 Neotropical Neoempheria.
Novitates Zoologicae 42:107-129, txt. figs.1-12, Pls.1-2.

Edwards, F.W.
1941 Notes on British Fungus-Gnats.
Ent. Mo. Mag. 77:21-32, Figs.1-4.

Edwards, F.W.
1941 Mycetophilidae Collected by the Expedition to Matto Grosso of the Brazilian Zoological Club, in July 1939.
Rev. Ent. 12:303-314, figs.1-5, Pl.15.

Enderlein, G.
1911 Neue Gattungen und Arten Aussereuropaischer Fliegen.
Stettin Ent. Zeit. 72:135-209, figs.1-4.

Fisher, E.G.
1937 New North American Fungus Gnats.
Jour. N.Y. Ent. Soc. 45:387-401, Pls.29-30.

Fisher, E.G.
1938 North American Fungus Gnats II.
Trans. Amer. Ent. Soc. 64:195-200, Pl.9.

Fisher, E.G.
1939 Costa Rican Mycetophilidae.
Trans. Amer. Ent. Soc. 65:227-236, Pl.13.

Fisher, E.G.
1943 The Identity of Neoempheria flavohirta (Coq.) n. comb. and Neoempheria digitalis Fisher.
Ent. News 54:149-151, figs.1-2.

Freeman, P.
1951 Diptera of Patagonia and South Chile, Part 3, Mycetophilidae: vii, 1-138, figs.1-355.

Garrett, C.B.D.
1924 On British Columbia Mycetophilidae I.
Insec. Insc. Menst. 12:60-67.

Garrett, C.B.D.
1924 On British Columbia Mycetophilidae II.
Insec. Inc. Menst. 12:159-169.

Harvey, E.N.
1952 Bioluminescence.
Academic Press, New York: 1-649, figs.1-187.

Heeger, E.
1851 Beitrage zur Naturgeschichte der Insecten.
Sitzben. Akad. Wiss. Wien 7:394, Pl.11. From Madward,1933.

Hudson, G.V.
1950 Fragments of New Zealand Entomology.
Wellington, N.Z.: 1-188, figs.1-4, Pls.1-17, Pls.A-B.

Hunter, W.D.
1900 A Catalogue of the Diptera of South America.
Trans. Amer. Ent. Soc. 26:260-298.

Johannsen, O.A.
1909 Diptera, Family Mycetophilidae.
Genera Insectorum, Fasc. 93:1-140, Pls.1-7.

Johannsen, O.A.
1910 The Fungus Gnats of North America, Part 2.
Maine Agric. Expt. Sta. Bull. No.180:125-192, figs.83-147, 2 tables.

Johannsen, O.A.
1912 A Tertiary Fungus Gnat.
Amer. Jour. Sc. 34:140, fig.1.

Johannsen, O.A.
1926 Notes on Walker's Types of North American Mycetophilidae.
Can. Ent. 58:51-52.

Johnson, C.W.
1925 Fauna of New England. 15. List of the Diptera of Two-Winged Flies.
Occ. Papers Boston Soc. Nat. Hist. 7:1-326, txt. fig.1.

Kellogg, V.L.
1903 The Net-Winged Midges of North America.
Proc. California Acad. Sci. 3:187-224, txt. fig.1, Pl.18.

Kertesz, C.
1902 Catalogus Dipterorum.
Leipzig, Germany: 1:1-338.

Kertesz, K.
1909 Vier Neue Sudamerikanische Mycetophiliden.
Ann. Hist. Nat. Mus. Hungarici 7:139-142. From Int. Cat. Sci. Lit. 9, 1911.

Landrock, K.
1927 Fungivoridae. Die Fliegen der Palaearktischen Region 8:1-195, txt. figs.1-26, Pls.1-13.

Landrock, K.
1940 Pilzmucken oder Fungivoridae.
Tierw. Deutsch., Part 38:1-166, figs.1-338.

Lane, John
1943 The Geographic Distribution of Sabethini,
Rev. Ent. 14:409-429, 9 maps, 5 tables.

Lane, J.
1946 New Brazilian Mycetophilidae.
Rev. de Ent. 17:339-360, figs.1-14.

Lane, J.
1948 Mycetophilinae de Boracea, Sao Paulo.
Rev. Ent. 19:231-278, figs.1-61.

Lane, J.
1953 Neotropical Mycetophila.
Dusenia 3:421-434, figs.1-20.

Le Conte, J.L.
1891 The Complete Writings of Thomas Say on the Entomology of North America.
A.E. Foote, Phila., Penna. 1: xxiv, 1-412, Pls.1-54.

Loew, H.
1850 Uber den Bernstein und die Bernsteinfauna.
Program der Koniglichen Realschule zu Meseritz 1850:3-44.

Loew, H.
1866 Diptera Americae Septentrionalis Indigena.
Centuria 7. Berl. Ent. Zeit. 10:1-54. From Zool. Record, 1866.

Loew, H.
1869 Diptera Americae Septentrionalis Indigena.
Centuria 9. Berl. Ent. Zeit. 13:129-186.

Lynch-Arribalzaga, F.
1892 Dipterologia Argentina (Mycetophilidae).
Bol. Acad. Nac. Cienc. Cordoba 12:377-436.

Lynch-Arribalzaga, F.
1892 Complemento a los Mycetophilidae.
Bol. Acad. Nac. Cienc. Cordoba 12:471-483, Pls.1-2.

Madwar, S.
1937 Biology and Morphology of the Immature Stages of Mycetophilidae.
Philos. Trans. Roy. Soc. London(B) 227: 1-110, figs.1-392.

Malloch, J.R.
1917 A Preliminary Classification of Diptera, Exclusive of Pupipara, Based on Larval and Pupal Characters, with Keys to Imagines in Certain Families
Bull. Illinois Lab. Nat. Hist. 12: V, 161-409, Pls.28-57.

Mansbridge, G.H.
1933 On the Biology of Some Ceroplatinae and Macrocerinae.
Trans. Ent. Soc. London 81:75-90, figs.1-15.

Meigen, J.W.
1800 Nouvelle Classification des Mouches a Deux Ailes d'Apres un Plan Tout Nouveau.
Paris.

Meigen, J.W.
1803 Versuch Einer Neuen Gattungs- Entheilung der Europaischen Zweiflugeligen Insekten.
Illiger's Magazin fur Insektenkunde 2:259-281.

Meigen, J.W.
1818 Systematische Beschreibung der Bekannten Europaischen Zweiflugeligen Insekten.
Achen and Hamm. 1:36-324, Pls.1-11.

Meigen, J.W.
1830 Systematische Beschreibung der Bekannten Europaischen Zweiflugeligen Insekten.
Achen and Hamm. 6:4-401, Pls.55-66.

Meigen, J.W.
1838 Systematische Beschreibung der Bekannten Europaischen Zweiflugeligen Insekten.
Achen und Hamm. 7:12-434, Pls. 67-74.

Meunier, F.
1904 Monographie des Cecidomyidae, des Sciaridae, des Mycetophilidae et des Chironomidae de l'Ambre de la Baltique.
Ann. Soc. Sci. Bruxelles 28:12-92. From Zoo. Record,1904.

Meunier, F.
1922 Nouvelle Contribution a la Monographie des Mycetophilidae de l'Ambre de la Baltique.
Rev. Sci. Bourbon. Moulins 1922:114-120. From Zoo. Record, 1922.

Okada, I.
1934 Beitrag zur Kenntnis der Fungivoriden-Fauna Japans I.
Insecta Matsumurana 9:12-18, fig.1.

Okada, I.
1937 Notes of Two Mycetophilidae, Dynatosoma maculipes (Mats.) and Rondaniella dimidiata (Mg.), Reared from Pleurotus serotinus (Fr.) Gill.
Mushi, Fukuoka 10:1-6, figs.2. From Zoo. Record,1937.

Okada, I.
1940 Die Fungivoriden-Fauna von Honshu.
Tenthredo 3:24-44, Pl.1. From Zoo. Record,1940.

Osten-Sacken, C.R.
1878 Catalogue of the Described Diptera of North America.
Smithsonian Misc. Colls. 270: xlviii, 1-276.

Osten-Sacken, C.R.
1886 Characters of the Larvae of Mycetophilidae.
Heidelberg, Germany: 1-29, Pl.2. Privately printed copy of an earlier paper.

Philippi, R.A.
1865 Aufzählung der Chilenischen Dipteren.
Verh. Zool.-Bot. Ges. Wien 15:595-782.

Rohdendorf, B.B.
1946 The Evolution of the Wing and the Phylogeny of Oligoneura.
Trav. Inst. Paleontologique 13:1-108, figs.1-97, Pls.1-16.

Rondani, C.
1856 Dipterologiae Italicae Prodromus, 1:1-226. From Horn and Schenkling,1929.

Schiner, J.R.
1868 Schlussbericht Über die von der Weltumseglungsreise der K. Fregatte Novara Mitgebrachten Dipteren.
Verh. Zool.-Bot. Ges. Wien 18:559-562.

Shaw, F.R.
1940 Some New Mycetophilidae.
Can. Ent. 72:48-51, Pl.4.

Shaw, F.R.
1940 Some New Mycetophilidae from Costa Rica.
Rev. Ent. 11:803-808, figs.1-8.

Shaw, F. R.
1941 Fungus Gnats from the Southern Appalachians. Pt. 1.
American Mid. Nat. 26:168-173, figs.1-11.

Shaw, F.R.
1941 Notes on the Mycetophilidae of the Great Smokies Mountains.
Bull. Brooklyn Ent. Soc. 36:23-24.

Shaw, F.R.
1947 Some Observations on the Variation in Wing Venation in the Mycetophilidae.
American Mid. Nat. 38:708-711, figs.1-4, 1 table.

Shaw, F.R.
1948 A Contribution to the Phylogeny of the Mycetophilidae.
Ann. Ent. Soc. America 41:189-199, Pls.1-3.

Shaw, F.R. & M.M. Shaw
1951 Relationships of Certain Genera of Fungus Gnats of the Family Mycetophilidae.
Smithsonian Misc. Colls. 117:1-23, figs.1-45.

Shaw, F.R. & E.G. Fisher
1952 Fungivoridae (Mycetophilidae), part VI, Fasc. 5.
Connecticut State Geol. and Nat. Hist. Survey Bull. 80: 177-212, figs.1-77.

Sherman, R.S.
1920 Notes on the Mycetophilidae of British Columbia.
Proc. Ent. Soc. Brit. Col. 1919 (14):12-15.

Sherman, R.S.
1921 New Species of Mycetophilidae.
Proc. Ent. Soc. Brit. Col. 1920 (16):16-21.

Simpson, G.G.
1950 History of the Fauna of Latin America.
Amer. Scientist 38:361-389, figs.1-10, 3 tables.

Skuse, F.A.A.
1888 Diptera of Australia. III. Mycetophilidae
Proc. Linn. Soc. New South Wales 3:1123-1157, Pls.31,32.

Skuse, F.A.A.
1891 Diptera of Australia. Nematocera. Suppl. II.
Proc. Linn. Soc. New South Wales 5:595-640, Pl.19.

Steenberg, C.M.
1924 Etude sur deux especes de Phronia dont les larves se forment de leurs excrements une couche protectrice: La Phronia strenua Winn. et la Phronia johannae n.sp.
Vidensk, Medd. fra Dansk naturh. Foren. 78:1-51, Pls.1-8, errata.

Steenberg, C.M.
1938 Recherches sur la Metamorphose d'un Mycetophile Delopsis aterrima (Zett.) Det Kgl. Danske Videnskabernes Selskab. Biologiske Meddelelser 14:1-29, Pls.1-8.

Stuardo, Carlos
1946 Catalogo de los Dipteros de Chile. Imprenta Universitaria, Santiago, Chile: 1-250.

Tillyard, R.J.
1919 The Panorpoid Complex. Part 3. The Wing-Venation. Proc. Linn. Soc. New South Wales 44:533-718, txt. figs. 35-112, Pls.31-35.

Tollet, Roger
1948 Un Mycetophilidae Nouveau des Etats-Unis d'Amerique. Bull. Mus. Roy. Hist. Nat. Belg. 24:1-4, figs.1-6.

Tonnoir, A.L. & F.W. Edwards
1926 New Zealand Fungus Gnats. Trans. New Zealand Inst. 57:747-878, figs.11-304.

Tonnoir, A.L.
1929 Australian Mycetophilidae. Synopsis of the Genera. Proc. Linn. Soc. New South Wales 54:584-614, txt. figs.1-7, Pls. 22-23.

Van Duzee, M.C.
1928 New Mycetophilidae Taken in California and Alaska. Proc. California Acad. Sci. 17:31-65, figs.1-34.

Van Dyke, E.C.
1940 The Origin and Distribution of the Coleopterous Insect Fauna of North America. Proc. Sixth Pacific Sci. Cong., Berkeley, Calif. 4:255-268, 1 map.

Walker, F.
1848 List of the Specimens of Dipterous Insects in the Collection of the British Museum 1:85-110, London.

Wheeler, W.M. and F.X. Williams
1915 The Luminous Organ of the New Zealand Glow-Worm. Psyche 22:36-43, Pl.3.

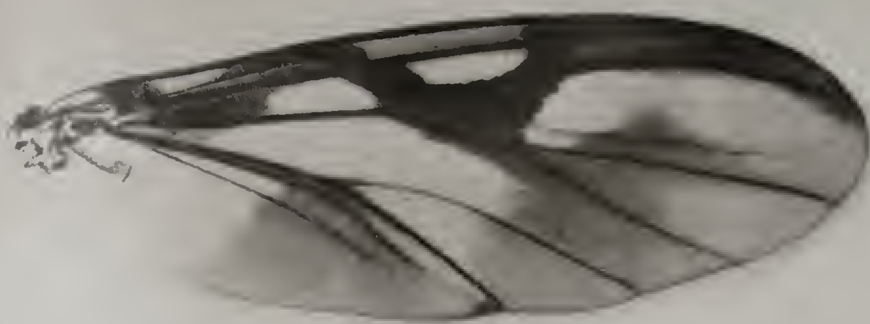
Wiedemann, E.R.W.
1828 Aussereuropaische Zweiflugelige Insekten 1:xxxii, 1-608, Pls.1-6.

Williston, S.W.
1896 On the Diptera of St. Vincent, W.I.
Trans. Ent. Soc. London 1896:253-435, 439-446, figs.1-170.

Winnertz, J.
1863 Beitrag zu Einer Monographie der Pilzmucken.
Verh. Zool.-Bot. Ges. Wien 13:637-964, Pls.18-21.

Plate 1

Wings of *Neoempheria* 18x



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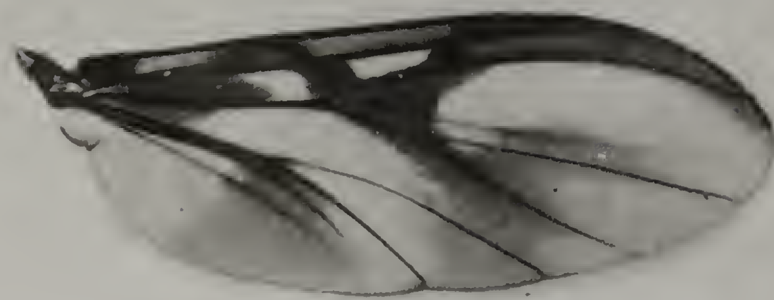
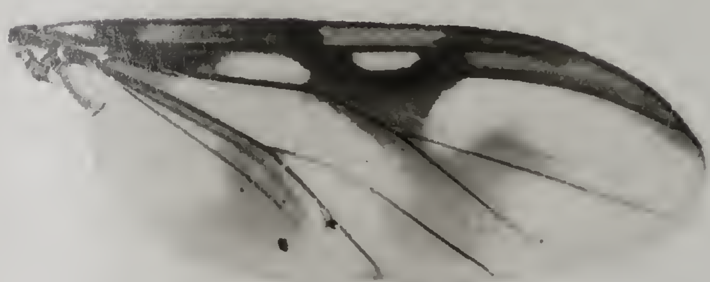
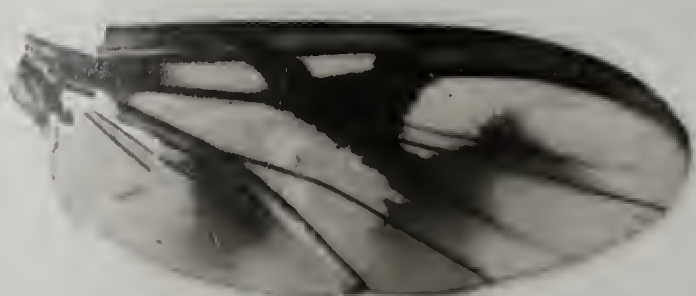


ecuadorensis



panamensis

glochis



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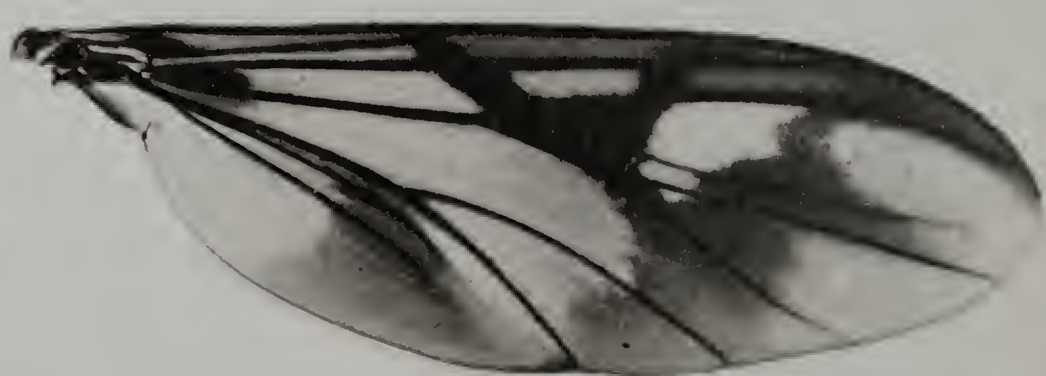
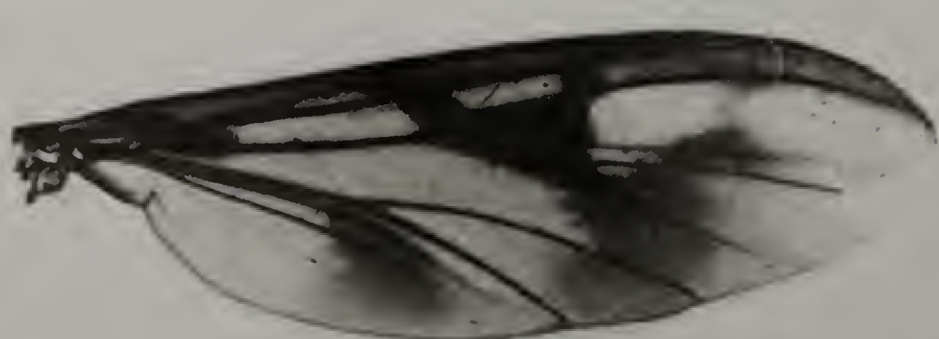


horrens

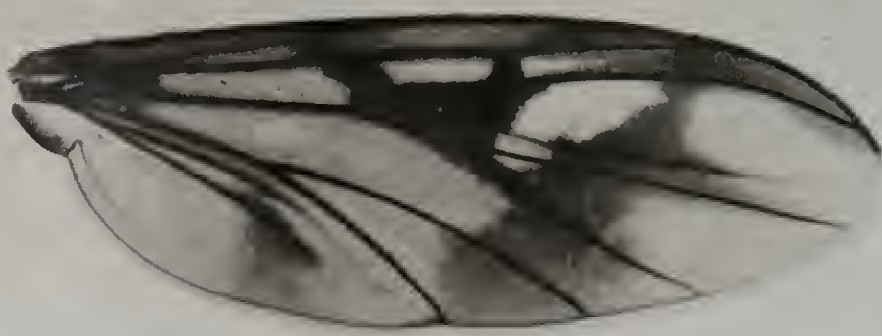
tetraphaea



subhorrens

Plate 2

Wings of <u>Neoempheria</u> 18x



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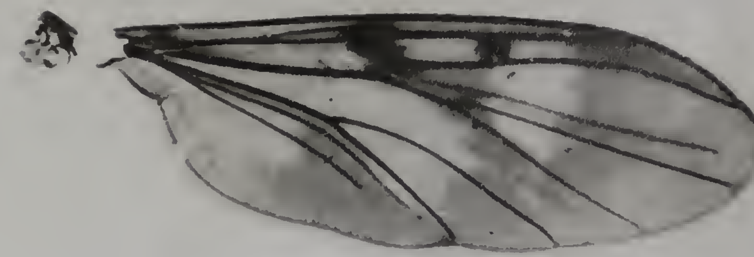

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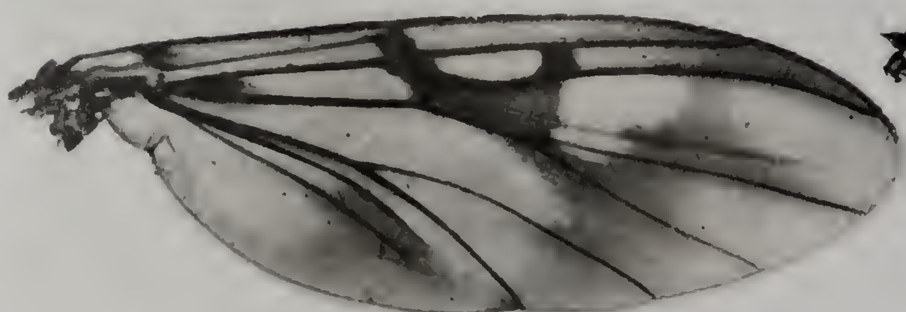
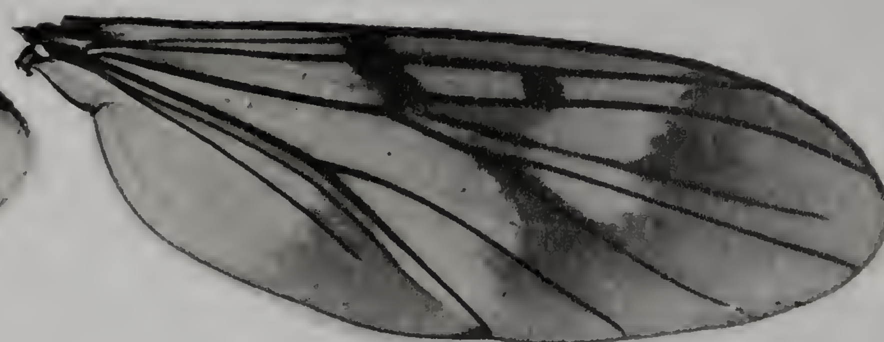


zeteki



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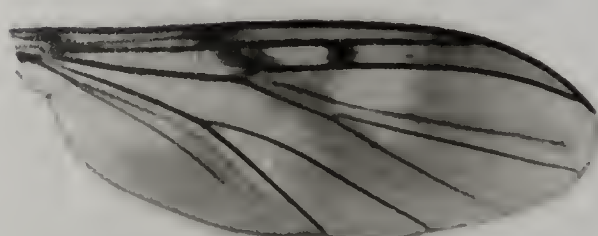

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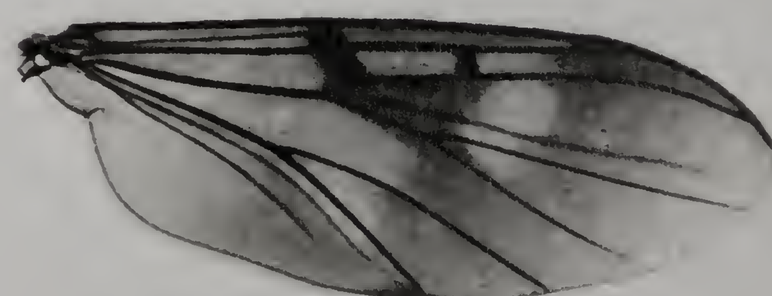

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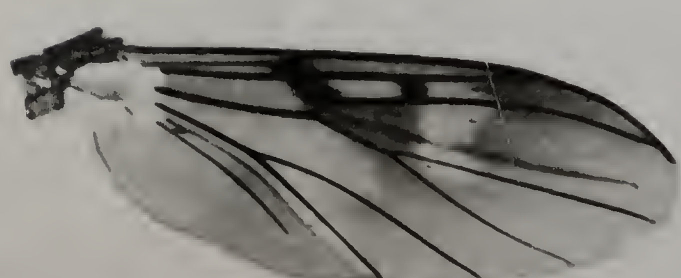

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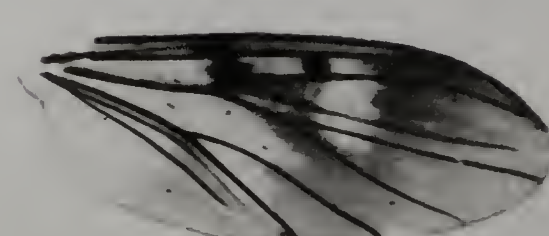
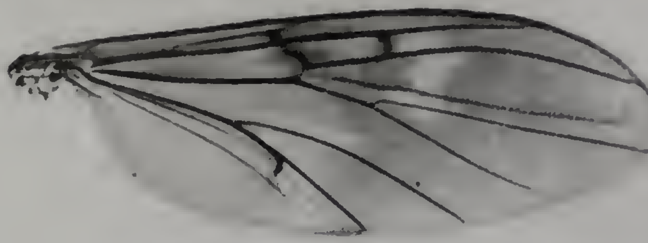


enderleini

Plate 3

Wings of <u>Neoempheria</u> 18x

philippsi



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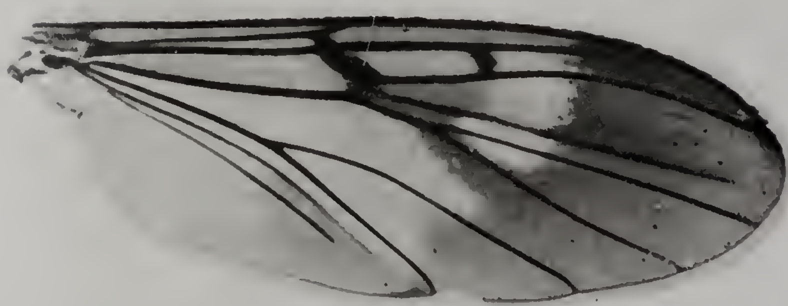

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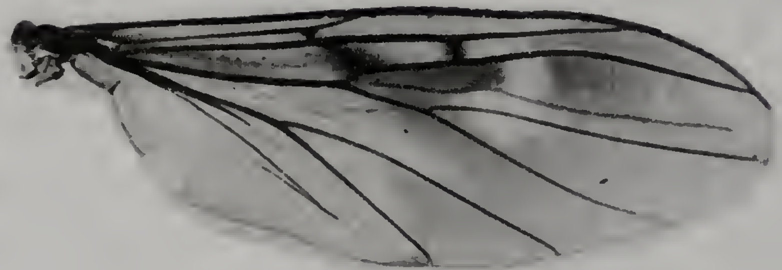

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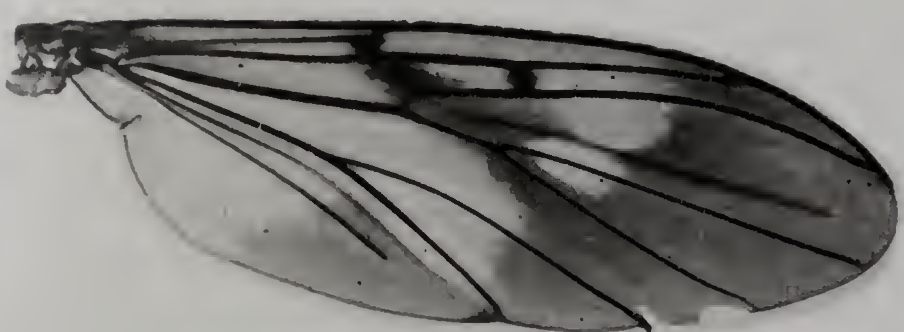
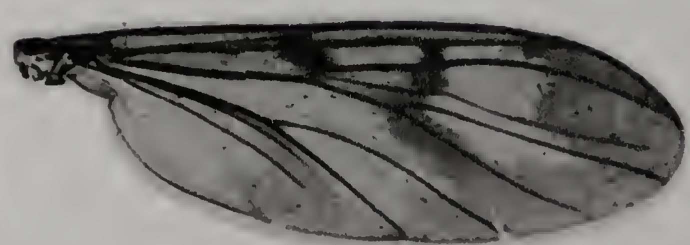
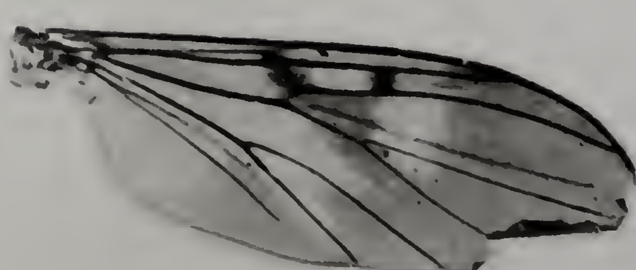


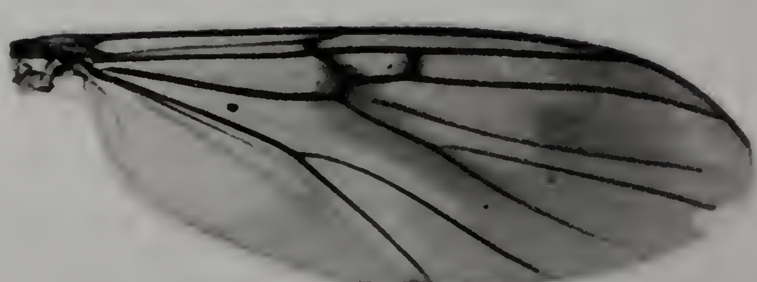
goiana



portoricensis



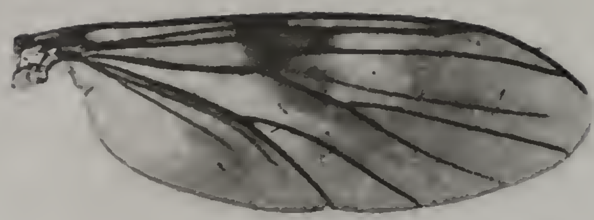
cincta



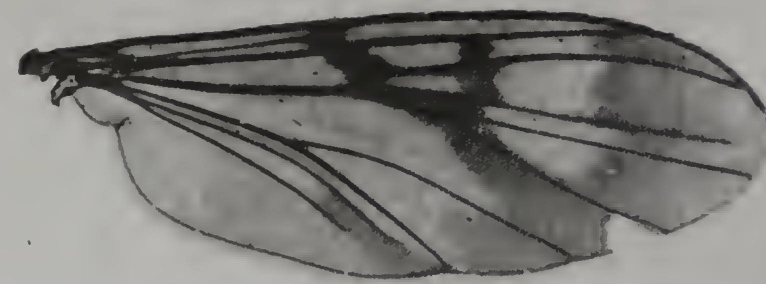
dziedzickii

Plate 4

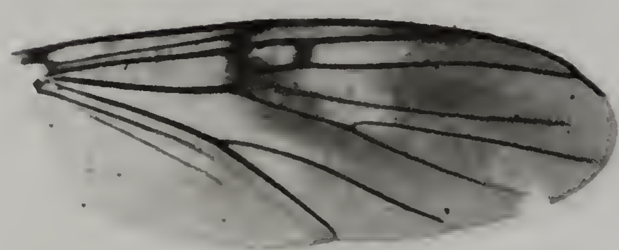
Wings of Neoempheria 18x



comes



costaricensis



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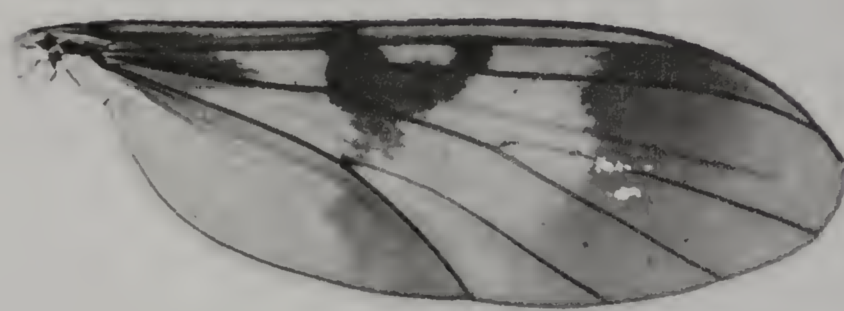
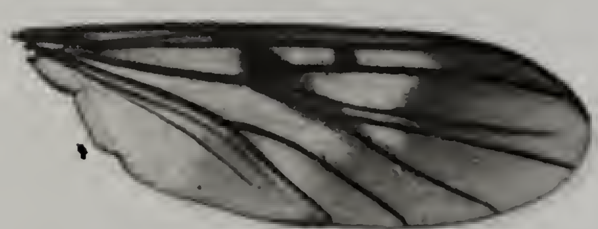
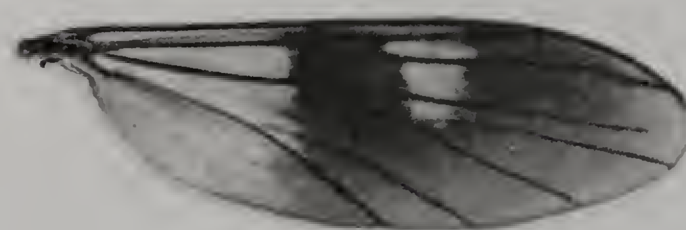


rabelloi



jugalis



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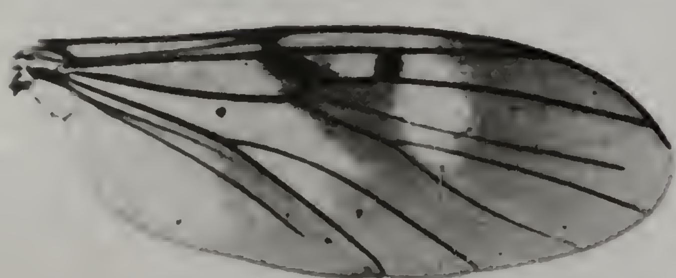
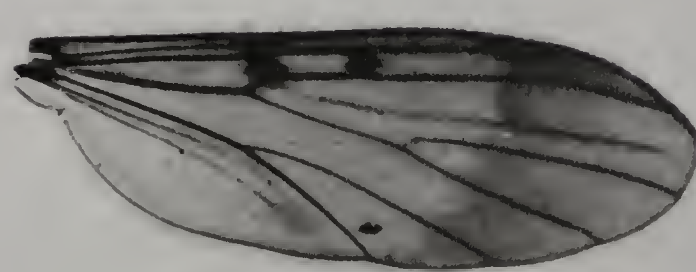


faceta



paulensis

brasiliensis

Plate 5

Neoempheria

fig. 1. _N. panamensis_, inner style of terminalia.

fig. 2. _N. bidentata_, tergal portion, male terminalia.

fig. 3. _N. bidentata_, sternal portion, male terminalia.

fig. 4. _N. ecuadorensis_, tergal portion, male terminalia.

fig. 5. _N. ecuadorensis_, sternal portion, male terminalia.

fig. 6. _N. glochis_, tergal portion, male terminalia.

fig. 7. _N. glochis_, sternal portion, male terminalia.

fig. 8. _N. horrens_, eighth tergite.

fig. 9. _N. horrens_, eighth sternite.

fig. 10. _N. horrens_, tergal portion, male terminalia.

fig. 11. _N. horrens_, sternal portion, male terminalia.

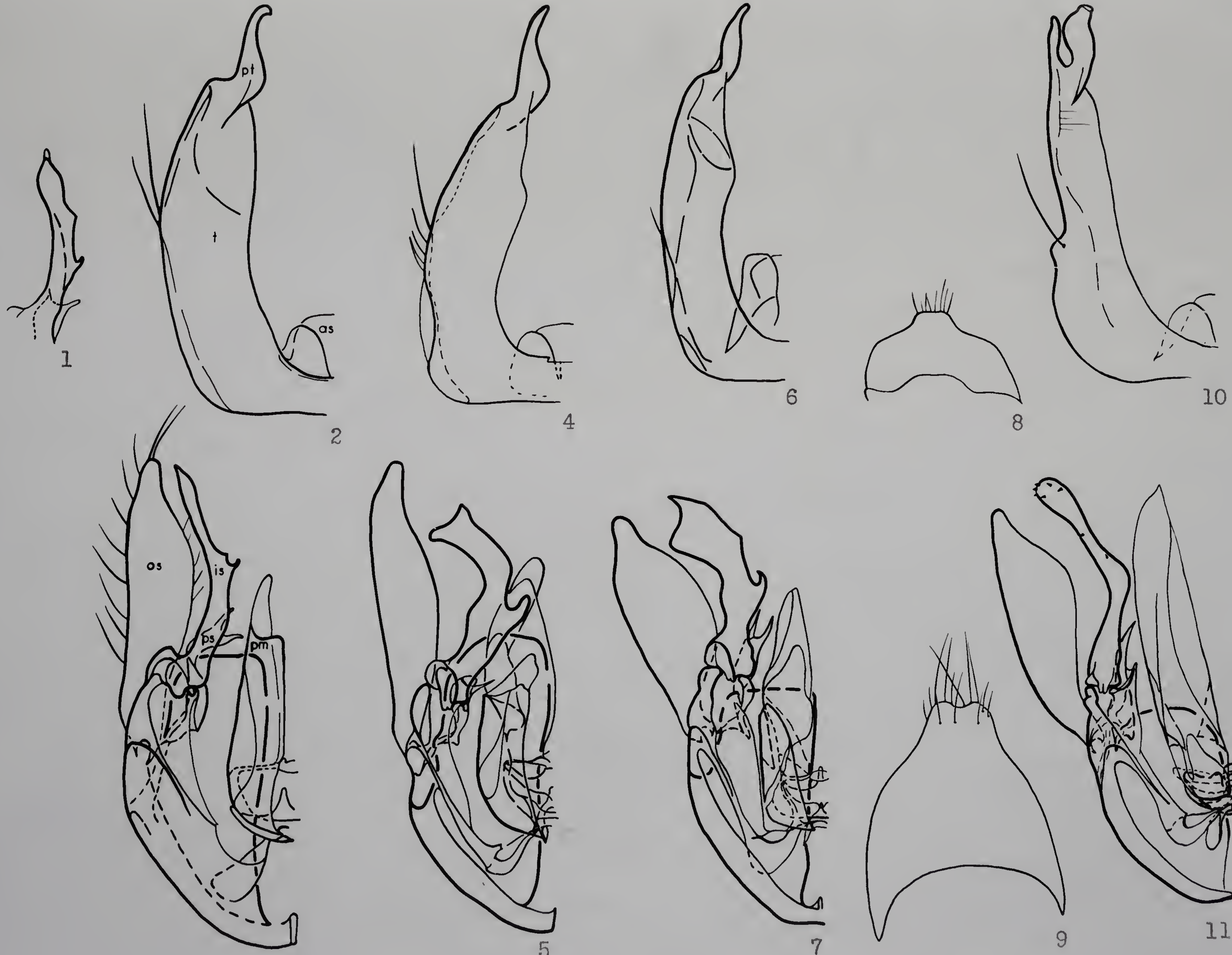

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Plate 6

Neoempheria

fig. 12. _N._ _subhorrens_, eighth tergite.

fig. 13. _N._ _subhorrens_, eighth sternite.

fig. 14. _N._ _subhorrens_, tergal portion, male terminalia.

fig. 15. _N._ _subhorrens_, aedeagus.

fig. 16. _N._ _acidoti_, tergal portion, male terminalia.

fig. 17. _N._ _acidoti_, sternal portion, male terminalia.

fig. 18. _N._ _zeteki_, tergal portion, male terminalia.

fig. 19. _N._ _zeteki_, sternal portion, male terminalia.

fig. 20. _N._ _bifida_, tergal portion, male terminalia.

fig. 21. _N._ _bifida_, sternal portion, male terminalia.

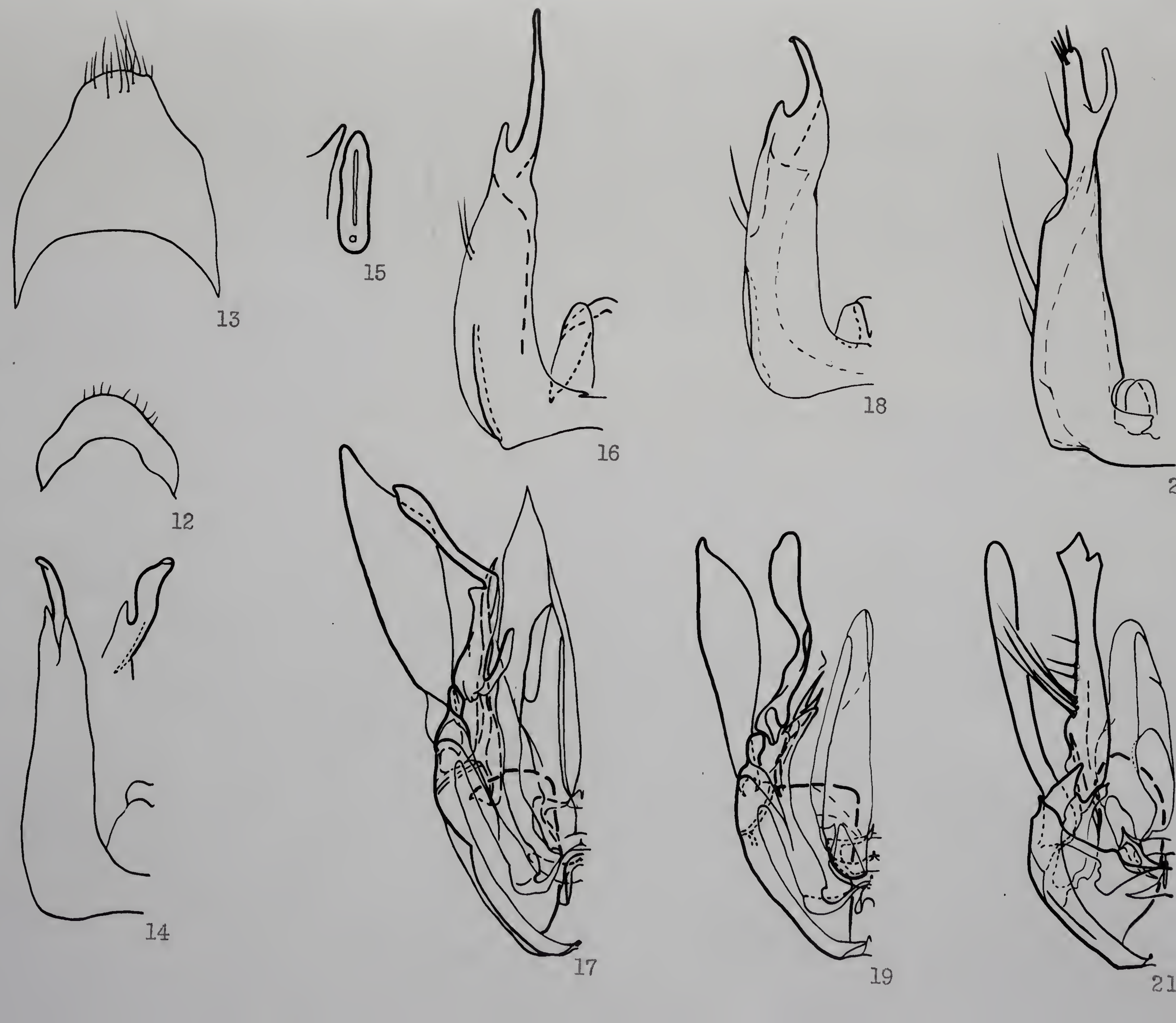
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Plate 7

Neoempheria

fig. 22. N. separata, tergal portion, male terminalia.

fig. 23. N. separata, sternal portion, male terminalia.

fig. 24. N. fallax, tergal portion, male terminalia.

fig. 25. N. fallax, sternal portion, male terminalia.

fig. 26. N. subfallax, outer and inner style, male terminalia.

fig. 27. N. larifuga, tergal portion, male terminalia.

fig. 28. N. larifuga, sternal portion, male terminalia.

fig. 29. N. longiseta, tergal portion, male terminalia.

fig. 30. N. longiseta, sternal portion, male terminalia.


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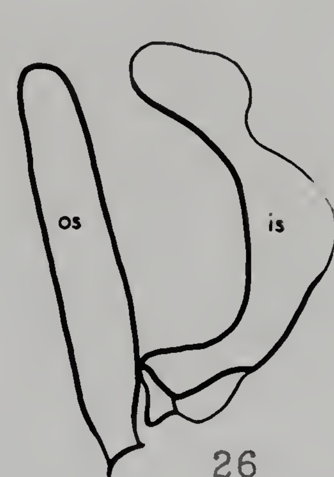

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Plate 8

Neoempheria

fig. 31. _N._ _goiana_, inner style, male terminalia.

fig. 32. _N._ _goiana_, subaedeagal plate.

fig. 33. _N._ _levir_, tergal portion, male terminalia.

fig. 34. _N._ _levir_, sternal portion, male terminalia.

fig. 35. _N._ _sublevir_, tergal portion, male terminalia.

fig. 36. _N._ _portoricensis_, tergal portion, male terminalia.

fig. 37. _N._ _portoricensis_, sternal portion, male terminalia.

fig. 38. _N._ _dziedzickii_, tergal portion, male terminalia.

fig. 39. _N._ _dziedzickii_, sternal portion, male terminalia.

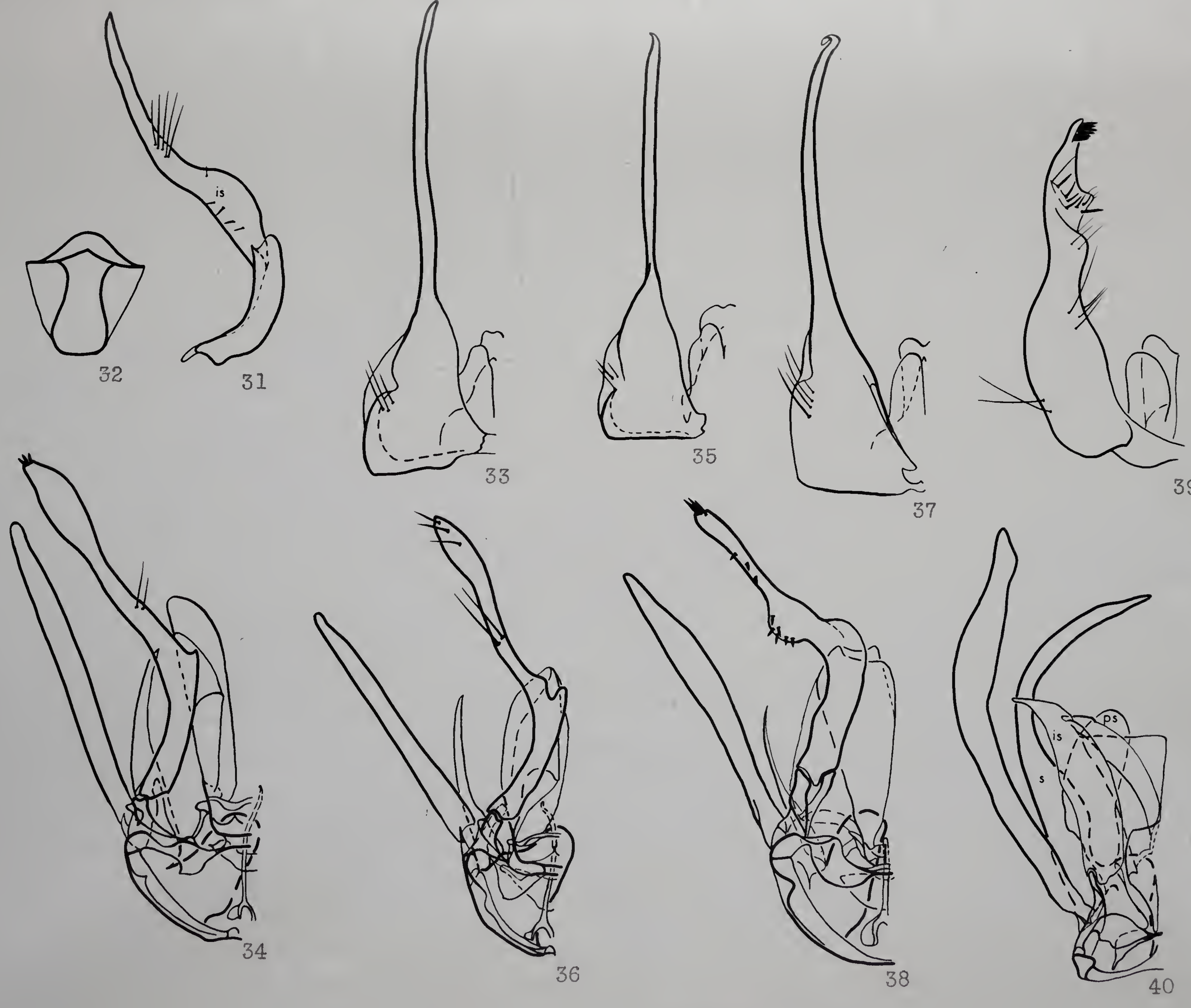
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Plate 9

Neoempheria

fig. 41. *N. comes*, tergal portion, male terminalia.

fig. 42. *N. comes*, sternal portion, male terminalia.

fig. 43. *N. socia*, tergal portion, male terminalia.

fig. 44. *N. socia*, sternal portion, male terminalia.

fig. 45. *N. jugalis*, tergal portion, male terminalia.

fig. 46. *N. jugalis*, sternal portion, male terminalia.

fig. 47. *N. faceta*, tergal portion, male terminalia.

fig. 48. *N. faceta*, sternal portion, male terminalia.

fig. 49. *N. faceta*, inner style.

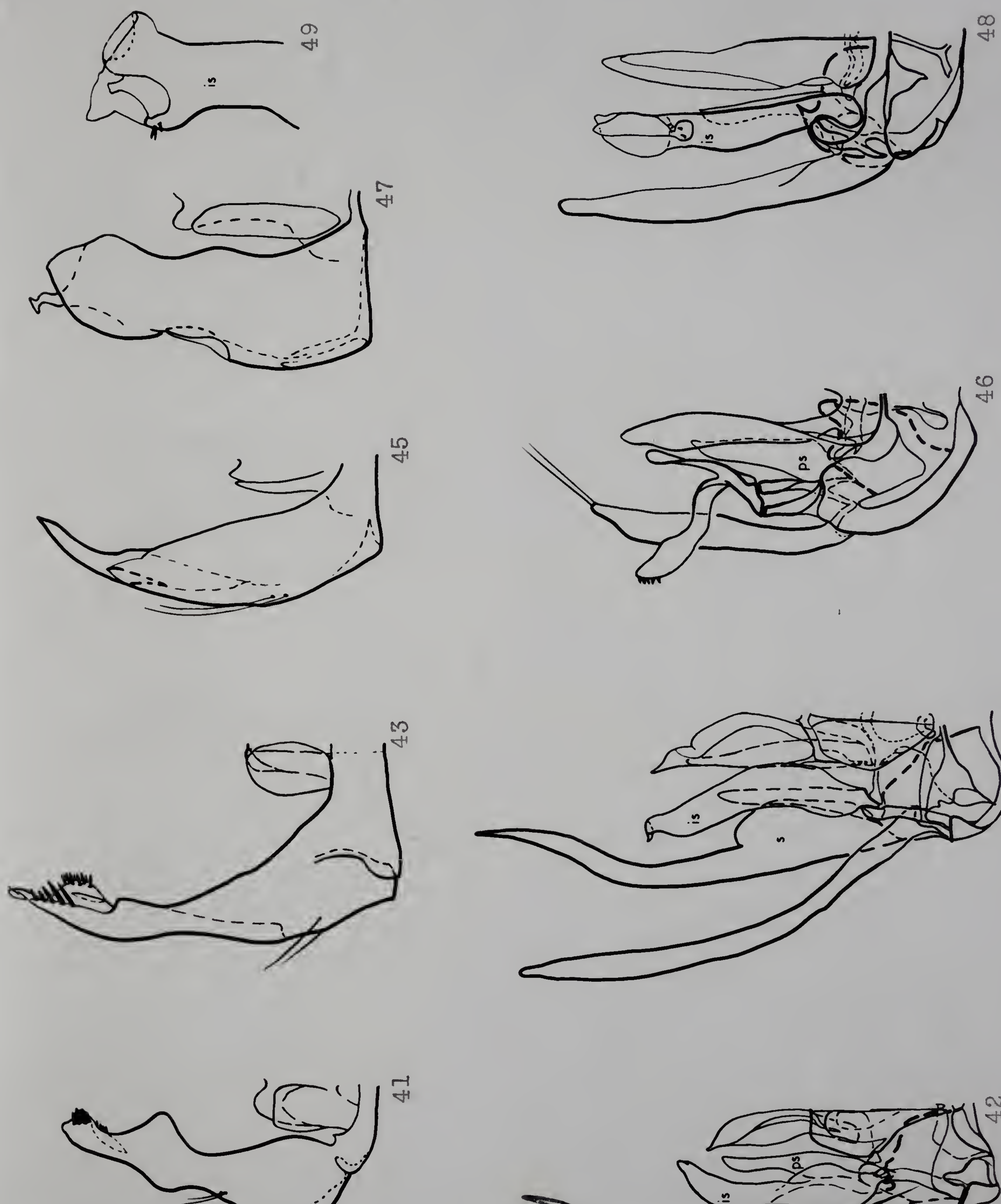
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Plate 10

<u>Neoempheria</u>

fig. 50. _N. costaricensis_, tergal portion, male terminalia.

fig. 51. _N. costaricensis_, sternal portion, male terminalia.

fig. 52. _N. lutzi_, tergal portion, male terminalia.

fig. 53. _N. lutzi_, sternal portion, male terminalia.

fig. 54. _N. rabelloi_, tergal portion, male terminalia.

fig. 55. _N. rabelloi_, sternal portion, male terminalia.

fig. 56. _N. defleta_, tergal portion, male terminalia.

fig. 57. _N. defleta_, sternal portion, male terminalia.


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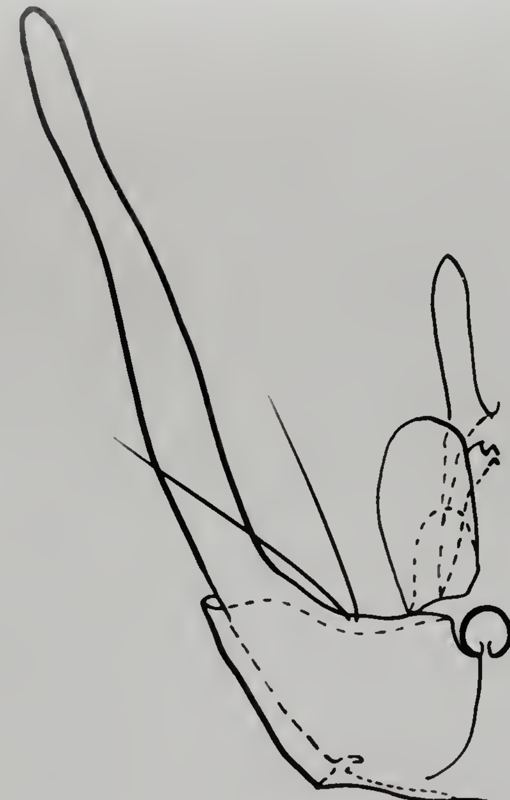
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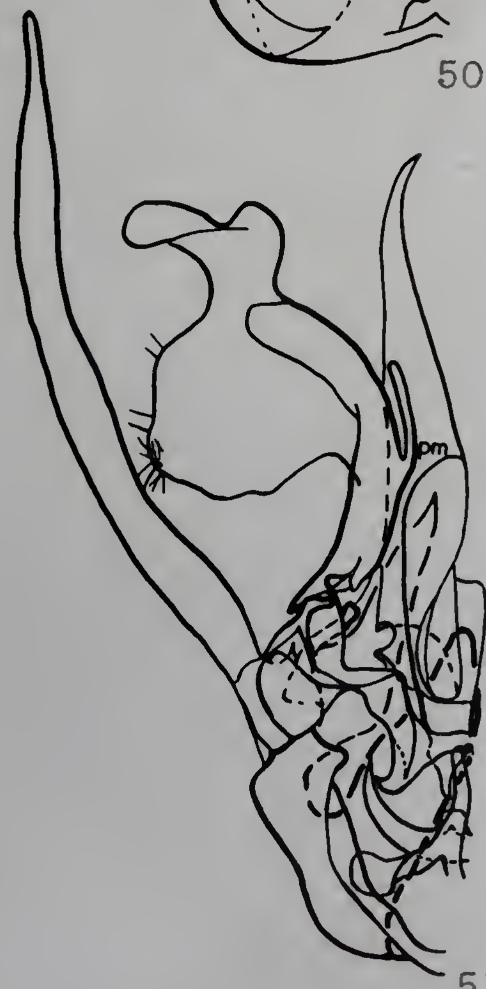

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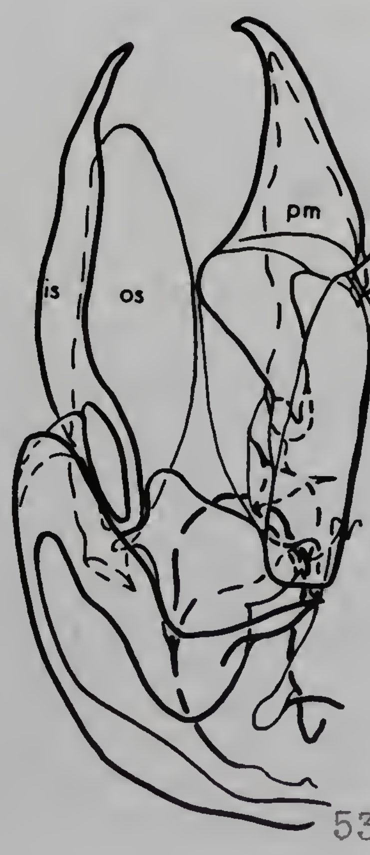

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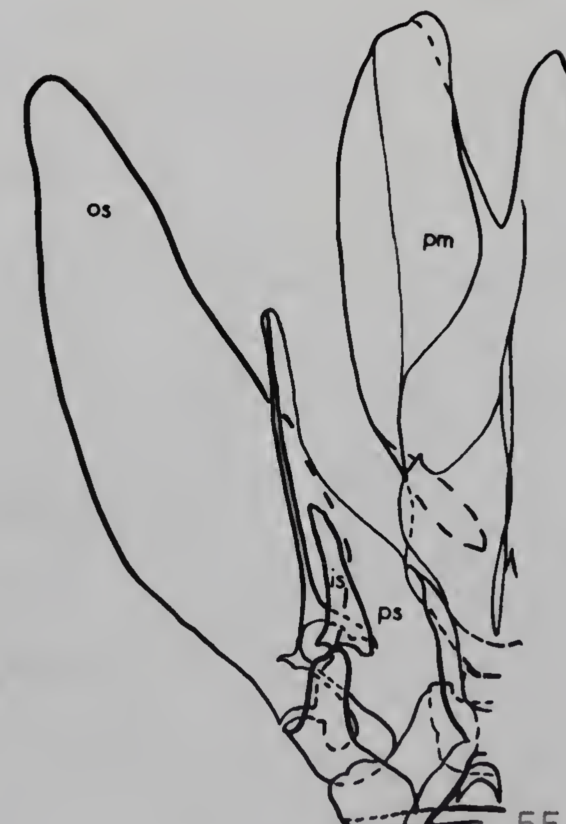

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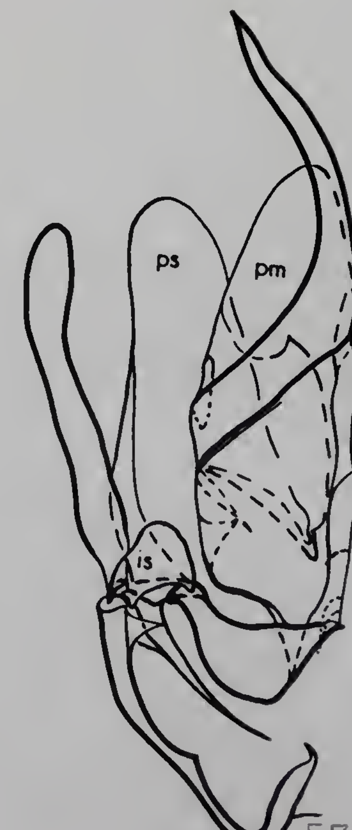

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Plate 11

Neoempheria

fig. 58. N. paulensis, tergal portion, male terminalia.

fig. 59. N. paulensis, sternal portion, male terminalia.

fig. 60. N. brasiliensis, tergal portion, male terminalia.

fig. 61. N. brasiliensis, sternal portion, male terminalia.

fig. 62. N. illustris, apex of inner style, Leverett, Mass.

fig. 63. N. illustris, apex of inner style, Atlanta, Ga.

fig. 64. N. illustris, apex of inner style, Bradenton, Fla.

fig. 65. N. illustris, apex of inner style, Holliston, Mass.

fig. 66. N. impatiens, tergal portion, male terminalia.

fig. 67. N. impatiens, sternal portion, male terminalia.

fig. 68. N. nepticula, inner style.

fig. 69. N. nepticula, apex of tergal style.

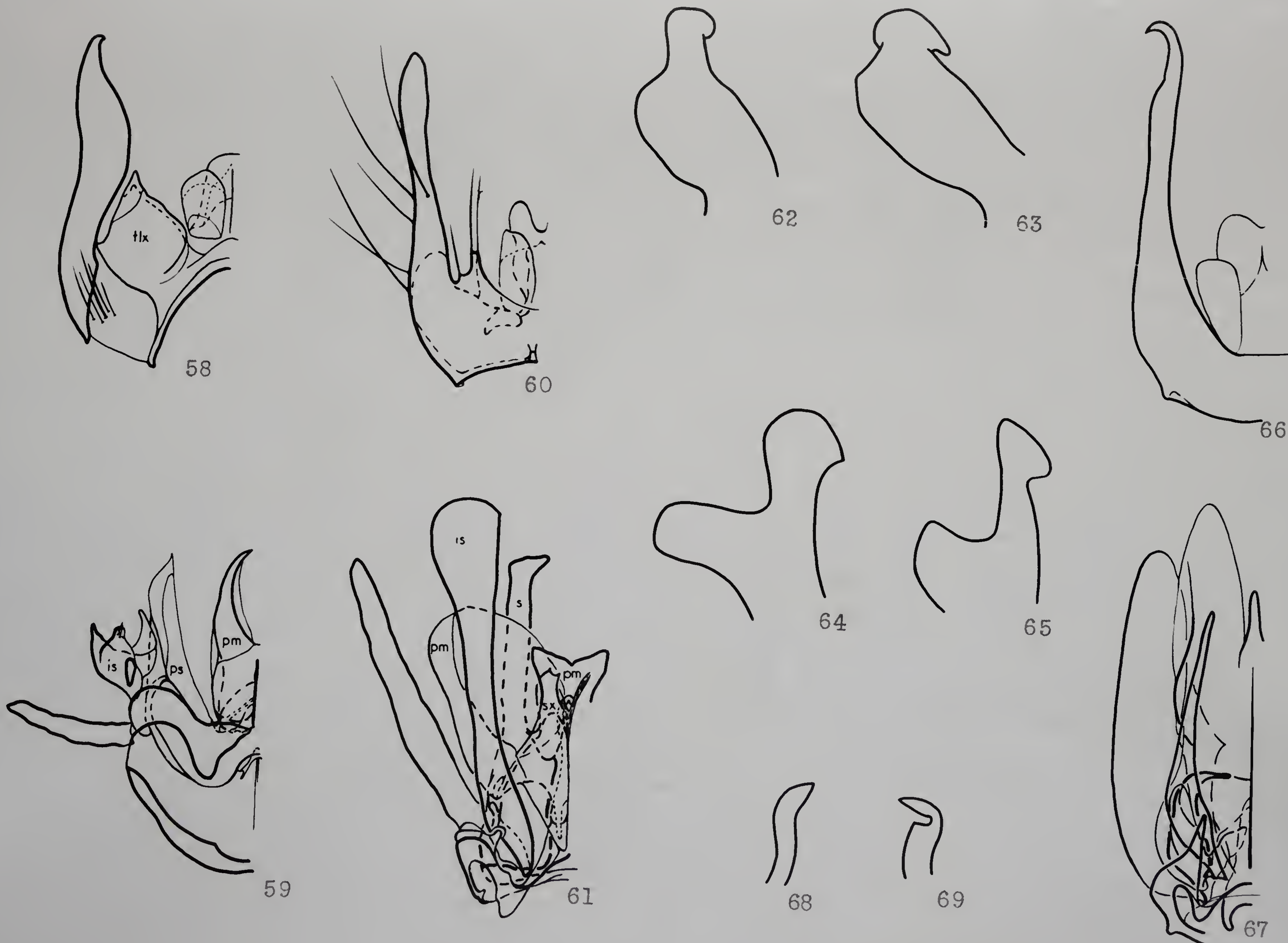
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Plate 12

Mycomyia

fig. 70. _M. tantalos_, tergal portion, male terminalia.

fig. 71. _M. tantalos_, sternal portion, male terminalia.

fig. 72. _M. austrobliqua_, tergal portion, male terminalia.

fig. 73. _M. austrobliqua_, sternal poftion, male terminalia.

fig. 74. _M. pontis_, tergal portion, male terminalia.

fig. 75. _M. pontis_, sternal portion, male terminalia.

fig. 76. _M. citrina_, tergal portion, male terminalia.

fig. 77. _M. citrina_, sternal portion, male terminalia.

fig. 78. _M. opacra_, tergal portion, male terminalia.

fig. 79. _M. opacra_, sternal portion, male terminalia.

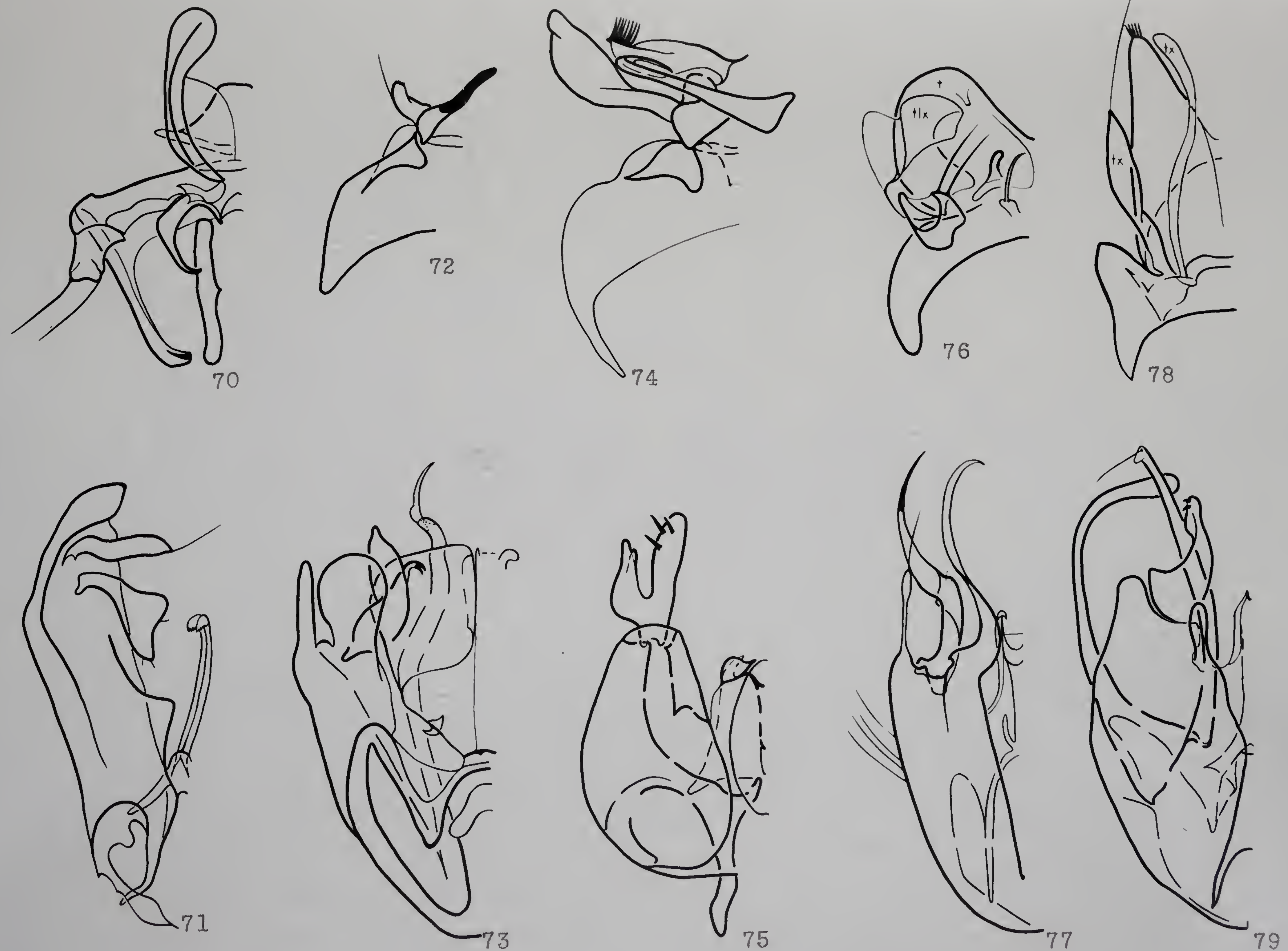
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Plate 13

Mycomyia

fig. 80. *M. subepacra*, tergal portion, male terminalia.

fig. 81. *M. subepacra*, sternal portion, male terminalia.

fig. 82. *M. excerta*, tergal portion, male terminalia.

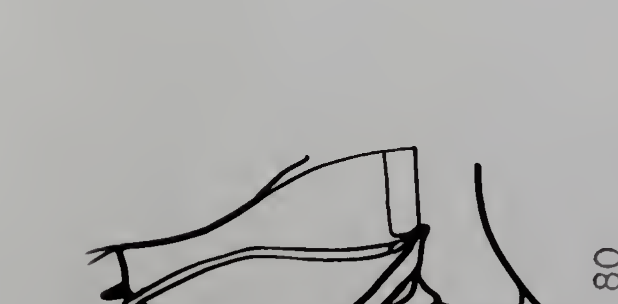
fig. 83. *M. excerta*, sternal portion, male terminalia.

fig. 84. *M. boracensis*, tergal portion, male terminalia.

fig. 85. *M. boracensis*, sternal portion, male terminalia.

fig. 86. *M. theobaldi*, tergal portion, male terminalia.

fig. 87. *M. theobaldi*, sternal portion, male terminalia.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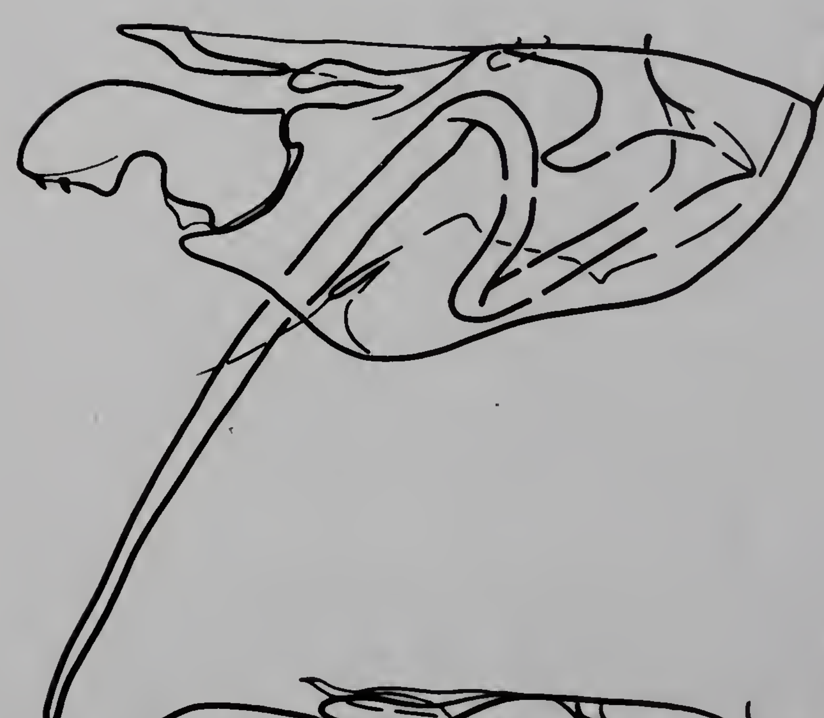
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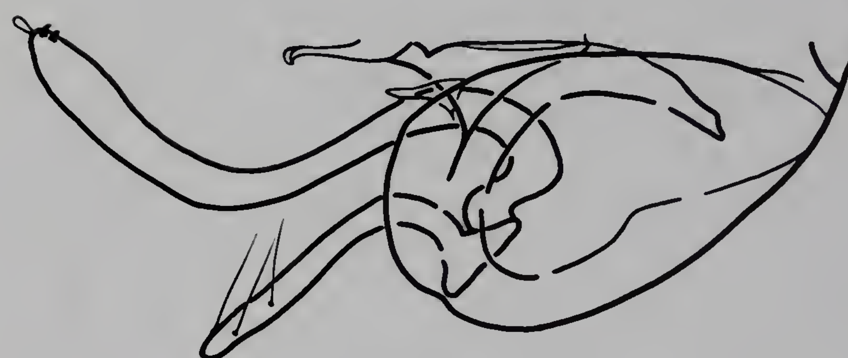
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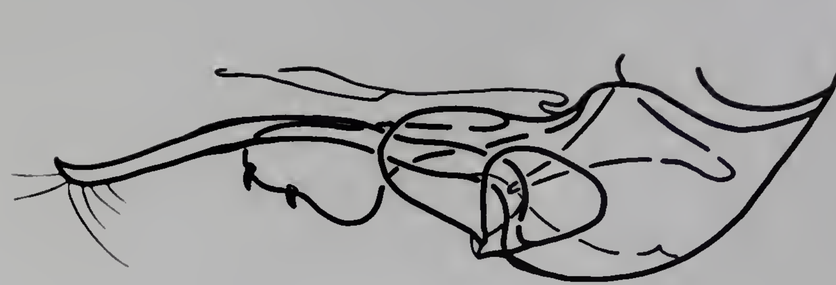
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Plate 14

Mycomyia

fig. 88. *M. simpla*, tergal portion, male terminalia.

fig. 89. *M. simpla*, sternal portion, male terminalia.

fig. 90. *M. multiseta*, tergal portion, male terminalia.

fig. 91. *M. multiseta*, sternal portion, male terminalia.

fig. 92. *M. dumeta*, tergal portion, male terminalia.

fig. 93. *M. dumeta*, sternal portion, male terminalia.

fig. 94. *M. dumeta*, anal segment.

fig. 95. *M. connecta*, tergal portion, male terminalia.

fig. 96. *M. connecta*, sternal portion, male terminalia.

fig. 97. *M. borinquensis*, tergal portion, male terminalia.

fig. 98. *M. borinquensis*, sternal portion, male terminalia.

fig. 99. *M. borinquensis*, anal segment.

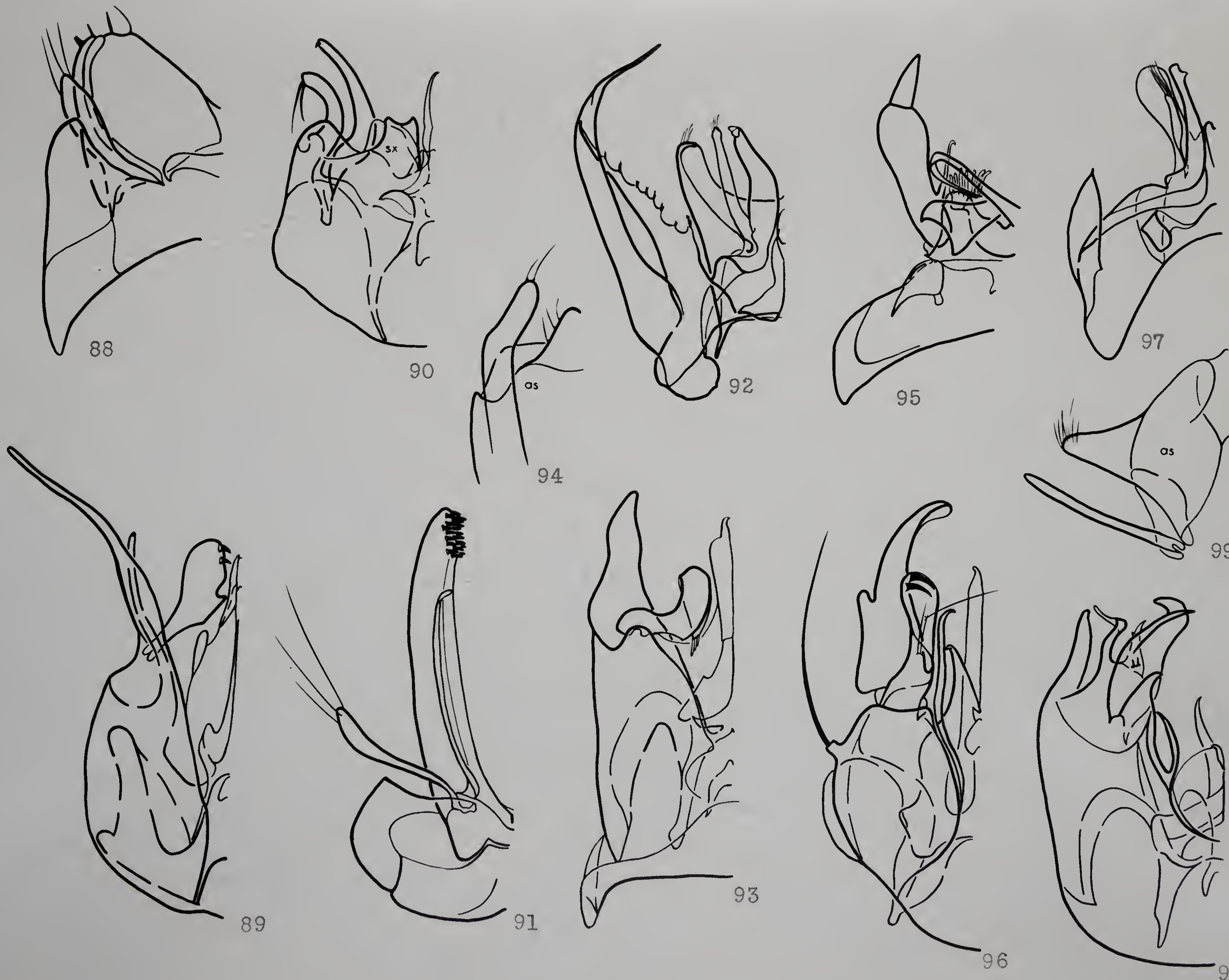
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Plate 15

Mycomyia

fig. 100. _M. campestra_, tergal portion, male terminalia.

fig. 101. _M. campestra_, sternal portion, male terminalia.

fig. 102. _M. portoblest_, tergal portion, male terminalia.

fig. 103. _M. portoblest_, sternal portion, male terminalia.

fig. 104. _M. pauperculus_, tergal portion, male terminalia.

fig. 105. _M. pauperculus_, sternal portion, male terminalia.

fig. 106. _M. hirticollis_, inner style.

fig. 107. _M. hirticauda_, inner style.

fig. 108. _M. fragilis_, tergal portion, male terminalia.

fig. 109. _M. fragilis_, sternal portion, male terminalia.


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Plate 16

<u>Mycomyia</u>

fig. 110. <u>M.</u> <u>terminata,</u> inner style.

fig. 111. <u>M.</u> <u>terminata,</u> aedeagus, lateral view.

fig. 112. <u>M.</u> <u>fulvitibia,</u> inner style.

fig. 113. <u>M.</u> <u>fulvitibia,</u> aedeagus, lateral view.

fig. 114. <u>M.</u> <u>dichaeta,</u> inner style.

fig. 115. <u>M.</u> <u>dichaeta,</u> aedeagus, lateral view.

fig. 116. <u>M.</u> <u>calcarata,</u> tergal portion, male terminalia.

fig. 117. <u>M.</u> <u>calcarata,</u> sternal portion, male terminalia.

fig. 118. <u>M.</u> <u>nigrihirta,</u> tergal portion, male terminalia.

fig. 119. <u>M.</u> <u>nigrihirta,</u> sternal portion, male terminalia.

fig. 120. <u>M.</u> <u>polleni,</u> tergal portion, male terminalia.

fig. 121. <u>M.</u> <u>polleni,</u> sternal portion, male terminalia.

fig. 122. <u>M.</u> <u>echinata,</u> tergal portion, male terminalia.

fig. 123. <u>M.</u> <u>echinata,</u> sternal portion, male terminalia.


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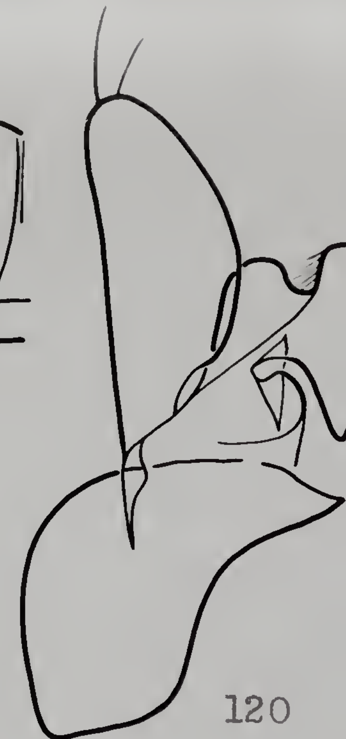
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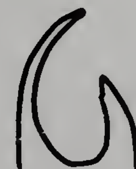
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Plate 17

<u>Mycomyia</u>

fig. 124. <u>M.</u> <u>vulgaris</u>, tergal portion, male terminalia.

fig. 125. <u>M.</u> <u>vulgaris</u>, sternal portion, male terminalia.

<u>Echinopodium</u>

fig. 126. <u>E.</u> <u>chiloensis</u>, tergal portion, male terminalia.

fig. 127. <u>E.</u> <u>chiloensis</u>, sternal portion, male terminalia.

fig. 128. <u>E.</u> <u>chiloensis</u>, male mesocoxal spur.

fig. 129. <u>E.</u> <u>rionegrensis</u>, male mesocoxal spur.

fig. 130. <u>E.</u> <u>rionegrensis</u>, tergal portion, male terminalia.

fig. 131. <u>E.</u> <u>rionegrensis</u>, sternal portion, male terminalia.

Plate 17

Mycomyia

fig. 124. M. vulgaris, tergal portion, male terminalia.

fig. 125. M. vulgaris, sternal portion, male terminalia.

Echinopodium

fig. 126. E. chiloensis, tergal portion, male terminalia.

fig. 127. E. chiloensis, sternal portion, male terminalia.

fig. 128. E. chiloensis, male mesocoxal spur.

fig. 129. E. rionegrensis, male mesocoxal spur.

fig. 130. E. rionegrensis, tergal portion, male terminalia.

fig. 131. E. rionegrensis, sternal portion, male terminalia.

Plate 18

Faunal Zones of the Neotropical Region.

From Lane, 1943.

Map 1. Wallace, 1876, based on animals.

Map 2. Sclater, 1858, based on birds.

Map 3. Sclater and Sclater, 1899, based on animals.

Map 4. Haseman, 1912, based on paléontological evidence and fishes.

Map 5. Mello-Leitao, 1931, based on vertebrates.

Map 6. Mello-Leitao, 1937, based on vertebrates.

Map 7. Cabrera and Yepes, 1940, based on mammals.

Map 8. Lane, 1943, based on Sabethini.

Map 9. Lane, 1943, probable paths of dispersal for Sabethini.


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Map N.1


GUIANO-BRASILIAN
PATAGONIAN
Map N.2


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Map N.3


ORINOCO
GUIANA
AMASON
PARAGUAY
PATAGONIAN
Map N.4


GUYANO-AMAZONICA
BORORO-CARIRI
TUPI-GUARANI
PATAGONICA
Map N.5


CARIBA
HYLEA
GÊ
BORORO
TUPI
GUARANI
ANDINO-PATAGONIAN SUB-REGION
Map N.6


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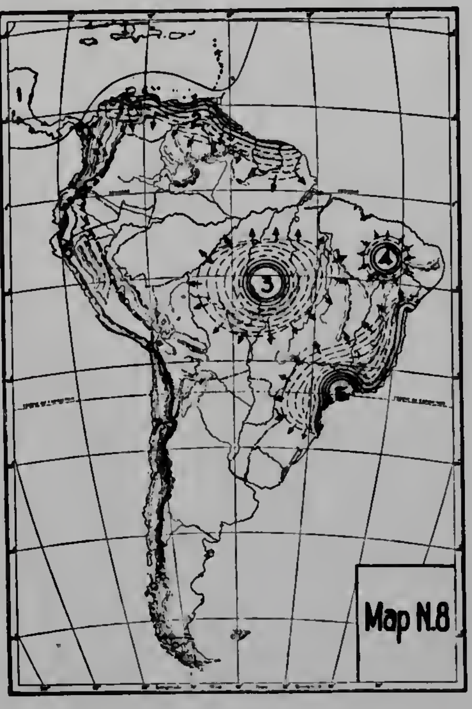
Map N.7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Map N.8

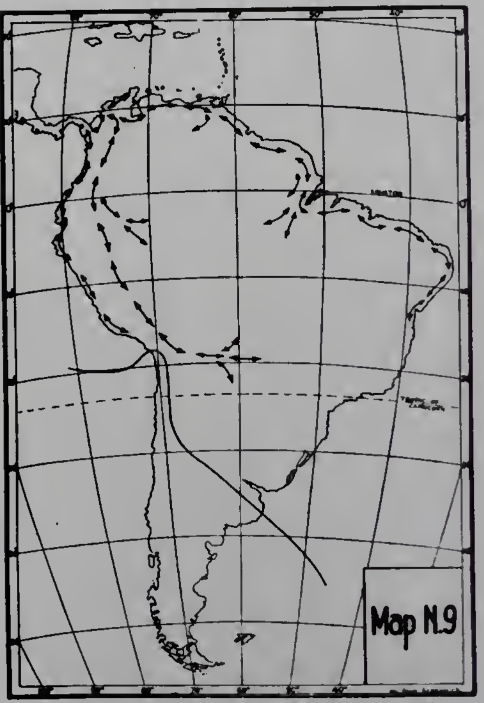
Map N.9

Plate 19

Faunal Zones of the Nearctic Region Based on a Study of Coleoptera, Van Dyke, 1940.

1. Arctic zone
2. Hudsonian zone
3. Canadian zone
4. Alleghenian zone
5. Vancouveran zone
6. Sonoran zone
7. Californian zone
8. Neotropical zone

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